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FINAL Environmental Impact Statement

Leeville Project

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Elko, Nevada 89801-4611
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July 17, 2002

Dear Reader:

Enclosed for your review and comment is the Final Environmental Impact Statement (FEIS) for Newmont Mining Corporation's Leeville Project. The FEIS analyzes the effect of developing and operating an underground mine and ancillary facilities including dewatering operations for eighteen years. The Leeville Project consists of the West Leeville, Four Corners, and Turf ore bodies which will be accessed by five shafts, a waste rock disposal facility, and other ancillary facilities, including dewatering facilities. The Leeville Mine is located approximately 20 miles northwest of Carlin, Nevada.

This FEIS addresses those concerns raised during the public comment period on the Draft Environmental Impact Statement (DEIS) through April 29, 2002. This document includes all of the comment letters received on the DEIS and the BLMs responses to these comments, monitoring and mitigation measures that address predicted impacts from Newmont's proposed mining and dewatering operations at Leeville and an errata section.

Following a 30 day public review period, the Record of Decision (ROD) will be published. The decision reached in the ROD is subject to appeal to the Interior Board of Land Appeals. The 30-day appeal period starts with the publication of the ROD. Implementation of the Plan of Operations will begin after the ROD has been issued.

Your interest in the management of public lands is appreciated. If you have any questions, please contact Deb McFarlane, Leeville EIS Project Manager at the Bureau of Land Management, Elko Field Office, 3900 Idaho Street, Elko, NV, 89801.

Sincerely,

Helen Hankins

Helen Hankins,
Field Manager

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FINAL ENVIRONMENTAL IMPACT STATEMENT NEWMONT MINING CORPORATION'S LEEVILLE PROJECT

LEAD AGENCY:
U.S. Department of the Interior
Bureau of Land Management
Elko Field Office
Elko, Nevada

PROJECT LOCATION: Elko and Eureka counties, Nevada

COMMENTS ON THIS FINAL EIS SHOULD BE DIRECTED TO:
Deb McFarlane
Leeville Project EIS Project Manager
Bureau of Land Management
Elko Field Office
3900 East Idaho Street
Elko, NV 89801

DATE FINAL EIS FILED WITH ENVIRONMENTAL PROTECTION AGENCY: July 26, 2002

DATE BY WHICH COMMENTS SHOULD BE POSTMARKED TO BLM: August 26, 2002

ABSTRACT

This Final Environmental Impact Statement (FEIS) provides response to comments received by BLM during the public comment period on the Draft EIS (DEIS) for the Leeville Project. The DEIS analyzed potential impacts that could result from development of an underground gold mine located in the Carlin Trend, approximately 20 miles northwest of Carlin, Nevada. The DEIS also analyzed potential impacts associated with alternatives that would reduce or eliminate potential impacts of the Proposed Action. The Proposed Action includes construction of five shafts to access three main ore bodies at depths of approximately 2,500 feet below ground surface. Newmont would also construct ancillary mine facilities to support underground operations including shaft hoists, waste rock disposal facility, refractory ore stockpile, facilities to support backfilling operations, installation and operation of mine dewatering well system, water treatment plant, water pipeline system to transport dewatering water to existing irrigation and infiltration systems in the Boulder Valley, and reclamation of surface disturbances. The Leeville Project would result in surface disturbance totaling 486 acres of land (33 acres of private land and 453 acres of public land). The Leeville Project would have an approximate 18-year mine life and would produce about 18 million tons of ore and waste rock. In addition to the Proposed Action, three alternatives were analyzed in the DEIS: A) eliminate canal portion of the water discharge pipeline system; B) backfill shafts at closure; and C) relocate waste rock disposal facility and refractory ore stockpile. The Agency Preferred Alternative incorporates the Proposed Action and Alternatives A, B, and C.

Responsible Official for FEIS:

Helen Hankins

Helen Hankins
Manager, Elko Field Office

FINAL ENVIRONMENTAL IMPACT STATEMENT
NEWMONT MINING CORPORATION
LEEVILLE PROJECT

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CHAPTER 1

INTRODUCTION

This final environmental impact statement (FEIS) is prepared by the Bureau of Land Management (BLM) for Newmont Mining Corporation's proposed Leeville Project located in northern Nevada. The FEIS contains the Agency Preferred Alternative, a record of written and verbal comments received on the draft environmental impact statement (DEIS), an errata that corrects text, tables, and figures contained in the DEIS, and Newmont's Mitigation Plan for the Leeville Project (**Appendix A**). The previously distributed DEIS along with this document constitute the FEIS for the Leeville Project.

The Leeville Project DEIS was distributed for public comment on March 1, 2002, which initiated a 60-day public comment period. BLM received written comments and held one public meeting during the comment period, which ended April 29, 2002. Neither written comments nor questions raised during the public meeting identified the need for major changes in the DEIS. The DEIS has not been reprinted; therefore, this FEIS document must be read in conjunction with the DEIS.

The Agency Preferred Alternative is described in Chapter 2 of this document. Minor revisions to portions of the text and selected figures and tables in the DEIS are included in the Errata section (Chapter 3) of this FEIS. All comment letters received during the public comment period and responses to the comments are included in Chapter 4. References for this FEIS are listed in Chapter 5.

The FEIS also includes Newmont's Leeville Project Mitigation Plan as **Appendix A** which addresses impacts described in the DEIS and those identified through public comments. The Mitigation Plan was developed in conjunction with BLM. The Plan is comprehensive and includes mitigation measures for environmental effects that occur regardless of whether the impact occurs on private or public land. Mitigation measures included in the Plan provide for expansion of monitoring activities to account for potential impacts from the Leeville Project.

CHAPTER 2

AGENCY PREFERRED ALTERNATIVE

This chapter of the FEIS describes the Agency Preferred Alternative. The FEIS Agency Preferred Alternative incorporates the Agency Preferred Alternative described on page 2-42 of the DEIS, combined with Newmont's Leeville Project Mitigation Plan (**Appendix A**). This Mitigation Plan also includes monitoring activities that would be performed by Newmont.

The Agency Preferred Alternative would implement all components of the Proposed Action with the following modifications:

- Implementation of **Alternative A** – Eliminate Canal Portion of Water Discharge Pipeline System;
- Implementation of **Alternative B** – Backfill Shafts;
- Implementation of **Alternative C** – Relocate Waste Rock Disposal Facility and Refractory Ore Stockpile; and
- Implementation of Newmont's Leeville Project **Mitigation Plan**.

CHAPTER 3

ERRATA

This chapter contains specific modifications and corrections to text, figures, and tables in the Leeville Project DEIS. These corrections and modifications were made in response to comments received during the public comment period.

Page 1-2; 2nd column - Insert new **Reclamation Cost Estimate** subsection at the end of **AUTHORIZING ACTIONS.**

Reclamation Cost Estimate

Newmont has determined the cost of completing reclamation activities described under the Proposed Action including the agency preferred alternative to be $2.9 million. The reclamation cost estimate includes costs associated with reclamation activities including but not limited to monitoring; backfilling mine shafts; removal of surface support facilities; removal and reclamation of the dewatering pipeline system; regrading of waste rock disposal facility, haul roads, service roads, mine shaft and facility areas; placement of growth medium, seeding, and planting. Detailed description of the reclamation activities and the schedule for completing reclamation are contained in the revised Reclamation Plan located in *Newmont Proposed Plan of Operations for the Leeville Project, April 2002.*

Newmont has submitted the detailed reclamation cost estimate to BLM and NDEP for agency review. Agency review would be completed and the bond amount as determined by BLM and NDEP would be provided in the Record of Decision. In addition to the reclamation bond amount to be determined by the agencies, a financial instrument is being developed to address long-term groundwater and waste rock disposal site monitoring at the Leeville Project. See the Leeville Project Mitigation Plan. No surface disturbance would occur until the reclamation bond is posted.

Page 2-20; 2nd column, last paragraph of Waste Rock Disposal Facility section, is revised as follows:

A portion of waste rock resulting from development and operation of the Leeville Project underground mine would be Potentially Acid-Generating (PAG) waste rock. Due to the nature of underground mining, segregation of PAG waste rock is not usually possible because mining advance (in either ore or waste rock) in underground mines is less flexible in terms of scheduling removal of various waste rock types. It is necessary to mine whatever rock is present at an individual face of advance.

In cases where acid-base accounting (ABA) indicates the total mixture of waste rock is acid generating, Newmont would encapsulate PAG material within waste rock that has an ANP:AGP ratio of 3:1. The thickness of the encapsulating layers would be a minimum of 10-feet. Control measures for waste rock include: 1) placing PAG rock on a base constructed of compacted low permeability materials designed to minimize leaching to groundwater; 2) segregating and/or mixing PAG rock; 3) encapsulating PAG rock within acid-neutralizing rock (NNP greater than + 40); 4) sloping and wheel compacting lift surfaces; 5) controlling surface water to minimize infiltration; 6) encapsulating and capping PAG rock during reclamation; and 7) reclaiming the waste rock disposal facility.

Encapsulation is achieved by placing waste rock on a base constructed of compacted, low permeability materials, designed to prevent vertical migration of fluids. The base would consist of a 1-foot thick layer of neutral or acid neutralizing waste rock, subsoil, or borrowed subsoil compacted to achieve a hydraulic conductivity of $1X10^{-5}$ cm/sec. The base would be sloped to provide drainage. Precipitation falling within the base perimeter would report to the lowest elevation area on the low permeability base. Solution would then be captured in collection ditches constructed with a hydraulic conductivity of $1X10^{-6}$. Collection pond(s) for sampling and sediment control would be lined facilities suitable for collection of meteoric water that leaches through the waste rock. Pond bottoms would be constructed to achieve a hydraulic conductivity of $1X10^{-7}$ (engineering field tests would be performed to verify structures meet permeability specs). Acidic water is not expected from this facility as 88.6% of the waste rock generated by the Leeville Project is non-PAG. Newmont personnel would periodically inspect collection areas to determine conditions requiring removal and transport of excess water. Solution that has ponded would be sampled and analyzed quarterly for Maximum Contaminant Levels (MCLs). Water exceeding MCLs would not be allowed to hold in the collection pond for more than 20 days. After 20 days water would be trucked to Newmont's Mill 4 tailing facility located north of the Project site. Water that does not exceed MCLs would be allowed to evaporate.

Page 2-25; column 1, 1st paragraph, last sentence is revised as follows:

"Stormwater run-on and run-off diversions would be constructed to contain a 25-year, 24-hour storm event. Sediment control would use Best Management Practices (BMPs) as approved by NDEP."

Page 2-25; column 1, 1st full paragraph, lines 12 through 14, revised as follows:

"Interceptor ditches would be designed and constructed to accommodate a 25-year, 24-hour storm event."

Page 3-11 the Mine Rock Characterization section is revised as follows:

MINE ROCK CHARACTERIZATION

Three deeply buried gold bearing deposits occur in the Leeville Project area: 1) West Leeville; 2) Four Corners; and 3) Turf. Two distinct tectonic units, the upper plate and the lower plate, are present in the area of the deposit. These two units are separated by a thrust fault. All three ore deposits are located within the lower plate, but waste rock to be produced during mine development is located in both plates.

The upper plate is comprised of a single geologic formation known as the Vinini Formation (Ovi), consisting of siliceous mudstones, siltstones, cherts, silty limestones and their metamorphosed equivalents. The lower plate is comprised of three geologic formations: Rodeo Creek Formation (Drc), consisting of siliceous mudstones, siltstones and sandstones; Popovich Formation (Dp), a massive limestone; and Roberts Mountains (SDrm) Formation, consisting of silty limestone.

Three types of mine rock have been identified within the three deposits, based on carbon content and oxidation: 1) unoxidized carbonate rock, 2) carbon sulfide refractory rock, and 3) unoxidized intrusive rock. These classifications reflect metallurgical characteristics of the rock. As the intrusive is volumetrically a small portion of the deposit, characterization was focused on the first two rock types.

Overall, a total of ten classes of waste rock and three classes of ore have been characterized for Leeville, based on deposit, lithology, mineralogy (i.e., carbon and sulfide content), and thrust plate location (**Table 3-3**). The upper plate Turf Unoxidized Carbonate unit (TW1) would not be mined, however, and is therefore not considered further in this EIS. The three ore types and nine waste rock types to be extracted during the Leeville Project are characterized in this EIS.

TABLE 3-3
Mine Rock Classification and Sampling
Leeville Mine Project

Rock Type	Deposit	Domain	Formation	Carbon Classification	No. Samples
WLW1	West Leeville	Upper Plate	Ovi	UC	59
WLW2	West Leeville	Upper Plate	Ovi	CSR	113
WLW3	West Leeville	Lower Plate	SDrm, Dp	UC	119
WLO	West Leeville	Lower Plate	SDrm, Dp	UC	65
FCW1	Four Corners	Lower Plate	Drc, Dp, SDrm	CSR, UC, UI	131
FCO	Four Corners	Lower Plate	Dp, SDrm	CSR	48
TW1	Turf	Upper Plate	Ovi	UC	105
TW2	Turf	Upper/Lower Plate	Ovi/Drc	CSR	205
TW3	Turf	Lower Plate	Dp	UC	62
TW4	Turf	Lower Plate	SDrm HW	UC	36
TW5	Turf	Lower Plate	SDrm FW	UC	In TW4
TW6	Turf	Lower Plate	SDrm4	UC	In TW4
TO	Turf	Lower Plate	Drc, Dp, SDrm	UC	30
Total Samples					**973**

Notes:
Carbon Classification distinguishes carbon content of waste. UC = Unoxidized Carbonate; CSR = Carbon Sulfide Refractory; UI = Unoxidized Intrusive. Rock types classified as WLW = West Leeville Waste; WLO = West Leeville Ore; FCW = Four Corners Waste; FCO = Four Corners Ore; TW = Turf Waste; TO = Turf Ore; Ovi = Vinini Formation; SDrm = Roberts Mountains Formation; Dp = Popovich Formation; Drc = Rodeo Creek Formation; HW = Hanging Wall; FW = Foot Wall. Source: Coxon 1997.

Sampling

A suite of 973 representative samples was collected from drill cuttings for gold assay. Samples were chosen to be laterally and stratigraphically representative of the overall ore bodies, and were split using conventional sub-sampling techniques to prevent particle size bias. The studied samples are representative of the overall deposit. Of these 973 samples, 143 assay samples were in ore and 830 were in waste rock. In addition, of the 973 samples, 37 percent are Turf waste rock, 26 percent West Leeville waste rock, 12 percent Four Corners waste rock, 6 percent West Leeville ore, 4 percent Four Corners ore, and the remaining 15 percent Turf ore.

Geologic logs, assay data, carbon classification, and the mine plan were used to develop composite samples that represent bulk composition for each of the ore and waste rock types proposed to be mined. The number and length of intervals included in the composites varied between materials, as summarized by Coxon (1997). A total of 725 intervals, out of the 830 intervals of waste rock, were included in the nine composites of waste rock proposed to be mined at the Leeville Project. All 143 ore intervals were included in composites for the three ore deposits.

In addition, two master composite samples were prepared to represent run-of-mine ore and waste rock from the West Leeville, Four Corners, and Turf deposits (Coxon 1997). Results of whole rock geochemical analyses of the master composites (summarized in **Table 3-4**) indicate that ore and waste rock are very similar in composition, and that the rocks are composed primarily of silicates followed by carbon (loss on ignition or LOI), aluminum, magnesium, calcium, iron, and trace amounts of titanium, potassium, manganese, phosphorus, and barium.

TABLE 3-4
Whole Rock Analytical Results
Leeville Mine Project

Master Composite	Major Elements (percent by weight)											
	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	MgO	CaO	Na_2O	K_2O	MnO	P_2O_5	BaO	LOI
Ore	65.57	0.275	5.693	2.402	3.279	5.296	<0.27	0.705	0.014	0.133	0.044	8.50
Waste	65.96	0.256	5.404	1.853	2.847	5.894	<0.27	0.622	0.015	0.167	0.134	9.00

Notes: SiO_2 = silica; TiO_2 = titanium oxide; Al_2O_3 = aluminum oxide; Fe_2O_3 = iron oxide; MgO = magnesium oxide; CaO = calcium oxide; Na_2O = sodium oxide; K_2O = potassium oxide; MnO = manganese oxide: P_2O_5 = phosphate; BaO = barium oxide; LOI = Loss on ignition (surrogate for carbon). Source: Coxon 1997.

Composite samples were analyzed for metal release potential using meteoric water mobility procedure (MWMP) tests of metal mobility. The composite samples were also analyzed for acid generation potential (AGP), based on an acid base account (ABA) with sulfur speciation. Individual samples were also analyzed for AGP using the Net Carbonate Value (NCV) Leco method, by Newmont's in-house laboratories. Acid generation and metal release potential for ore and waste rock are discussed below.

Ore

Underground development of three Leeville Project ore deposits results in a high ore to waste ratio. Nearly 80 percent of the rock to be mined would be ore. All ore would be produced from the lower plate. Ore in the West Leeville and Four Corners deposits occurs in the Silurian-Devonian Roberts Mountain (SDrm) and the Devonian Popovich (Dp) formations. The Four Corners deposit has a high carbon and sulfide content, exhibits refractory metallurgical behavior, and is identified as carbon sulfide refractory ore (CSR). The West Leeville ore has high carbonate content, but is unoxidized, and is identified as unoxidized carbonate (UC). The Turf deposit occurs in the Rodeo Creek (Drc), Roberts Mountains (SDrm), and Popovich (Dp) formations. Like West Leeville, the Turf deposit is comprised of unoxidized carbonate rock.

The ABA and MWMP analyses were completed for the three composite samples of each ore type as well as for the master ore composite sample (**Table 3-5a**). The number of samples included in each composite is presented in the table, along with the Net Neutralization Potential (NNP), which is equal to Acid Neutralization Potential (ANP), less the Acid Generation Potential (AGP), in units of tons of $CaCO_3$ or equivalent per 1,000 tons of native rock (T/kton). **Table 3-5a** also shows the Neutralization Potential Ratio (NPR), which is equal to ANP/AGP. Major ion and metal concentrations measured in MWMP extracts are also shown, with pertinent Nevada water quality standards as a basis for comparison.

The ANP and AGP of ore to be mined under the Proposed Action was also analyzed for 143 individual ore samples, as summarized in **Table 3-5b**. AGP was determined using the standardized NCV static test method. Carbon (total, carbonate, and organic) and sulfur (total, sulfate, and sulfide) species were determined by Leco furnace before and after roasting to remove sulfate and carbonate, thereby allowing organic carbon and sulfide sulfur to be calculated by difference.

Total sulfur content for ore units ranges from 1.4 to 6.1 percent, with a run-of-mine average of 3.0 percent. Sulfide-sulfur ranges from 1.1 to 5.2 percent, with a run-of-mine average of 2.6 percent. Calculated average ANP, AGP, NCV, NNP, and the NPR (ANP/AGP) are shown in **Table 3-5b** for each ore type and run-of-mine ore. The NPR values in **Table 3-5a** differ slightly from NPR values in **Table 3-5b** because the samples in **Table 3-5a** are composites, whereas NPR results in **Table 3-5b** are from individual sample analyses.

The ABA results show that while Four Corners and, to a lesser degree, Turf ores are potentially acid generating (PAG) (i.e., NPR less than the BLM standard 3.0 and the NDEP standard 1.2), West Leeville ore is net neutralizing and meets the BLM standard of 3.0 NPR or higher.

TABLE 3-5a
Ore Rock – ABA and MWMP Test Results
Leeville Project

Rock Type	Plate	Fm	Lith	Lab No.	n	ABA: NNP	ABA: NPR	MWMP Major Ions: Cl	Fl	NO_3	CN	SO_4	TDS	pH
						T/kton $CaCO_3$		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	s.u.
WLO	LP	SDrm, Dp	UC	112946	65	182	6.0	7.04	<0.2	<0.1	.0.01	1500	2550	7.91
FCO	LP	SDrm, Dp	CSR	112947	48	-84.9	0.05	8.29	5.54	0.67	<0.01	3660	5570	2.98
TO	LP	Drc, Dp, SDrm	UC	153006	30	18.8	1.3	14.2	0.8	0.12	<0.01	2730	4500	6.86
Master Ore Composite	UP/LP	all	all	182532	nd	114	3.6	7.6	1.6	0.15	<0.01	3480	5640	5.75
Nevada Water Quality Standards								**250**	**4.0**	**10**	**0.2**	**250**	**500**	**5.0-9.0**

Rock Type	MWMP Metals: Sb	As	Ba	Be	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Ni	Se	Ag	Tl	Zn
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
WLO	1.11	0.118	0.016	<.001	<.0024	<.005	<.003	<.024	<.005	0.077	0.0003	<.017	0.008	<.003	0.033	0.003
FCO	0.656	30.2	0.024	0.017	<0.012	1.85	9.74	668	<.005	1.51	<.0002	7.81	<0.01	0.053	0.798	9.17
TO	0.109	<0.04	0.017	<0.02	0.019	<.008	<.004	9.39	<.004	3.64	0.0003	4.95	<.048	<.005	0.061	6.31
Master Ore Composite	0.096	<0.04	0.034	<.002	0.035	NA	<.004	189	0.008	3.44	0.0007	4.16	<.048	0.008	0.236	8.85
Nevada Water Quality Standards	**0.146**	**0.05**	**2.0**	**0.004***	**0.005**	**0.1**	**1.3***	**0.3*(s)**	**0.05**	**0.05*(s)**	**0.002**	**.0134**	**0.05**	**--**	**0.013**	**5.0* (s)**

TABLE 3-5b
Summary of NCV Data for Ore Units
Leeville Mine Project

Tons	% of Tons	No. Samples: Assay	No. Samples: Leco	% Total Carbon	% Organic Carbon	% Carbonate Carbon	% Total Sulfur	% Sulfate Sulfur	% Sulfide Sulfur	ANP $\%CO_2$	AGP $\%CO_2$	NPR (ANP/AGP)	NCV %C02	NNP T/kton $CaCO_3$
West Leeville Lower UC Ore														
8,519,005	60.5	65	65	3.06	0.51	2.55	1.35	0.25	1.09	9.35	1.50	6.22	7.85	17.83
Four Corners Lower CSR Ore														
943,427	6.7	48	48	0.30	0.26	0.04	3.15	0.19	2.99	0.19	4.10	0.05	-3.91	-8.89
Turf UC Ore														
4,618,568	32.8	30	30	2.97	1.58	1.38	6.09	0.90	5.20	5.08	7.12	0.71	-2.04	-4.63
Total Ore														
14,081,000	100	143	143											
Run-of-Mine Weighted Average for Ore														
				2.85	0.85	2.00	3.02	0.46	2.57	7.34	3.52	4.00	3.82	867
PAG Percent of Total Ore Tonnage														
	39.50													

Notes:
State of Nevada Neutralization Potential Ratio (NPR) criteria = 1.2; BLM NPR criteria = 3.0.
Nevada water quality standards are the "Municipal or Domestic Supply" values listed in **Table 3-13**; if no corresponding standard exists, the federal drinking water standard is used and denoted by an asterisk (*). Values with (s) are secondary drinking water standard. Shading indicates results exceed Nevada water quality standards.
mg/L = milligrams per liter; n = number samples included in each composite; nd = No data; NNP = net neutralization potential; NPR = neutralization potential ratio; Dep = Deposit; WLO = West Leeville Ore; FCO = Four Corners Ore; TO = Turf Ore; UP = Upper Plate; LP = Lower Plate; Unk = Unknown; Fm = Formation; Ovi = Vinini Fm; SDrm = Roberts Mountains Fm ; Dp = Popovich Fm; HW = head wall; FW = foot wall; Lith = lithology; CSR = carbon sulfide refractory; UC = unoxidized carbonate; Sb = antimony; As = arsenic; Ba = barium; Be = beryllium; Cd = cadmium; Cr = chromium; Cu = copper; Fe = iron; Pb = lead; Mn = manganese; Hg = mercury; Ni = nickel; Se = selenium; Ag = silver; Tl = thallium; Zn = zinc; Cl = chloride; Fl = fluoride; NO_3 = nitrate; CN = cyanide; SO_4 = sulfate; TDS = total dissolved solids; pH = standard units; NCV = net carbonate value; ANP = acid-neutralizing potential; AGP = acid-generating potential; CO_2 = carbon dioxide; NNP = net-neutralization potential; $CaCO_3$ = calcium carbonate; PAG = potential acid-generating; MWMP = meteoric water mobility procedure. Source: Coxon 1997.

The MWMP data indicate that ore (especially the PAG Four Corners unit) has the potential to release metals above drinking water standards, including antimony, arsenic, beryllium, chromium, copper, iron, manganese, nickel, thallium, and zinc (**Table 3-5a**). The metals that show no elevated concentrations with respect to standards for ore are: barium, lead, mercury, and silver. For beryllium, chromium, selenium and copper, one ore sample exceeded the respective drinking water quality standards. All ore samples exceeded total dissolved solids (TDS) and sulfate standards. The Four Corners ore is PAG, but the pH of MWMP extracts for the other ores and the master composite are between 5.5 and 8.0 standard pH units.

As the ore is processed, it undergoes physical and chemical change. Tailing material that would result from processing of the Leeville Project ore would be managed at Newmont's tailing disposal facility in the South Operations Area.

Waste Rock

Three types of West Leeville waste rock, five types of Turf waste rock, and one type of Four Corners waste rock are proposed to be mined at the Leeville Project (**Table 3-6a**). The ABA and MWMP analyses were completed for the nine composite samples of waste rock, as well as for the master waste rock composite (**Table 3-6b**). The NNP and NPR data indicate that the West Leeville (WLW2) and Turf (TW2) carbon sulfide refractory rock, as well as the mixed Four Corners waste rock (FCW1), are PAG. The master composite indicates a run-of-mine NPR of 5.1 (i.e., non-PAG), with an NNP of 121.

The AGP of waste rock to be mined under the Proposed Action was also analyzed for 780 individual waste rock samples, as summarized in **Table 3-6b**, using the standardized NCV static test method. For some waste rock intervals, two or more assay intervals were composited prior to NCV analysis, so that 50 fewer NCV analyses (780) were run than the total number of assayed waste rock intervals (830). The difference in number between intervals that were assayed and intervals that were analyzed by Leco is summarized for each waste rock type in **Table 3-6b**.

Total sulfur content for waste rock units ranges from 0.7 to 2.4 percent, with a run-of-mine average of 1.3 percent. Sulfide sulfur ranges from 0.4 to 2.1 percent, with a run-of-mine average of 1 percent. Calculated average ANP, AGP, NCV, NNP, and the NPR ratio (ANP/AGP) are shown in **Table 3-6b** for each waste rock type, and run-of-mine waste rock.

Review of the averaged NCV data for waste rock in **Table 3-6b** shows that, as indicated by the ABA analyses of the composites, the carbon sulfide refractory units in the West Leeville (WLW2), Turf (TW2), and Four Corners waste (FCW1) rock are PAG. NCV data also suggest that the Turf Popovich unoxidized carbonate (TW3) is PAG. Together, these units represent almost 12 percent of the total tonnage to be mined under the Proposed Action. Remaining waste rock units in the West Leeville and Turf deposits are non-PAG.

Most of the waste rock tested (i.e., West Leeville, Four Corners, and Turf) exhibit a tendency to leach some metals such as antimony, arsenic, manganese, nickel, thallium, and zinc. Samples that exceeded pertinent drinking water standards are highlighted in **Table 3-6a**. Sulfate and TDS concentrations typically exceeded water quality standards. Metals that show no elevated concentrations with respect to drinking water standards in any waste rock sample include barium, beryllium, chromium, copper, lead, mercury, silver, and with one exception, selenium. The pH of MWMP extracts is in the range of 7.5 to 8.2 standard pH units.

TABLE 3-6a
Waste Rock - ABA and MWMP Test Results
Leeville Project

						Acid Base Account		MWMP Major Ions						
Rock type	Deposit	Plate	Fm	Lith	n	NNP	NPR	Cl	Fl	NO_3	CN	SO_4	TDS	pH
						T/kton CaCO3		mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	s.u.
WLW1	West Leeville	UP	Ovi	UC	59	106	4.1	3.03	0.68	0.11	<0.01	503	829	8.07
WLW2	West Leeville	UP	Ovi	CSR	113	10.2	1.3	4.19	1.18	0.25	<0.01	555	910	8.22
WLW3	West Leeville	LP	SDrm, Dp	UC	119	152	15.7	4.13	0.29	<0.05	<0.01	728	1270	7.84
FCW1	Four Corners	LP	Drc, Dp, SDrm	CSR, UC, UI	131	-27.1	0.4	4.92	1.95	<0.25	<0.01	863	1390	7.68
TW2	Turf	UP/LP	Ovi/Drc	CSR	205	9.5	1.4	6.9	2.0	0.38	<0.01	217	558	8.17
TW3	Turf	LP	Dp	UC	62	104	3.2	21.4	0.7	0.1	<0.01	1980	3230	7.39
TW4	Turf	LP	SDrm HW	UC	36	171	6.5	20.2	1.1	0.18	<0.01	796	1400	7.79
TW5	Turf	LP	SDrm FW	UC	In TW4	137	6.3	17.9	1.1	0.25	<0.01	1470	2380	7.59
TW6	Turf	LP	SDrm4	UC	In TW4	315	26.2	22.1	1.2	0.16	<0.01	633	1040	7.79
Master Waste Rock Composite	all	LP/UP	all	UC/CSR	nd	121	5.1	7.4	0.7	0.1	<0.01	2030	3070	7.56
Nevada Water Quality Standards								**250**	**4.0**	**10**	**0.2**	**250**	**500**	**5.0-9.0**

Rock Type	MWMP Metals															
	Sb	As	Ba	Be	Cd	Cr	Cu	Fe	Pb	Mn	Hg	Ni	Se	Ag	Tl	Zn
	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
WLW1	.043	.125	.031	<0.001	<0.002	<0.003	<0.003	<0.017	0.002	0.021	<0.0002	<0.021	0.02	<0.002	<0.001	<0.002
WLW2	.048	.082	.035	<0.001	<0.002	<0.003	0.011	<0.017	<0.001	0.031	<0.0002	<0.021	0.031	<0.002	<0.001	0.006
WLW3	1.45	.067	.024	<0.001	<0.0024	<0.005	0.004	<0.024	0.002	0.025	<0.0002	0.04	0.021	0.003	0.008	0.007
FCW1	1.75	.843	.021	<0.001	<0.0024	<0.005	0.006	0.2	<0.005	1.11	0.0005	1.79	0.018	<0.003	0.01	0.119
TW2	.033	0.75	.215	<0.001	<0.0024	<0.005	0.024	1.21	0.004	0.099	0.0002	0.07	0.05	0.009	<0.01	0.067
TW3	.106	<.04	.014	<0.002	0.017	<0.008	<0.004	0.03	<0.004	1.53	<0.0002	5.52	<0.048	<0.005	0.028	6.07
TW4	.364	0.41	.043	<0.002	<0.002	<0.008	<0.004	<0.019	<0.004	0.086	<0.0002	0.135	<0.048	<0.005	0.01	0.024
TW5	.143	0.17	.019	<0.002	0.004	0.016	<0.004	<0.019	<0.004	0.398	<0.0002	0.681	<0.048	<0.005	0.014	0.688
TW6	.302		.024	<0.002	<0.002	<0.008	<0.004	<0.019	<0.004	0.009	<0.0002	0.021	<0.048	<0.005	0.005	<0.004
Master Waste Composite	.149	<.04	.029	<0.002	<0.002	NA	<0.004	0.054	<0.002	0.91	<00002	0.852	0.064	<0.005	0.032	0.472
Nevada Water Quality Standards	**0.146**	**0.05**	**2.0**	**0.004***	**0.005**	**0.1**	**1.3***	**0.3*(s)**	**0.05**	**0.05* s**	**0.002**	**0.0134**	**0.05**	**--**	**0.013**	**5.0*(s)**

Notes:
State of Nevada Neutralization Potential Ratio (NPR) criteria = 1.2; BLM NPR criteria = 3.0.
Nevada water quality standards are the "Municipal or Domestic Supply" values listed in **Table 3-13**; if no corresponding standard exists, the federal drinking water standard is used and denoted by an asterisk (*). Values with (s) are secondary drinking water standard.
Shading indicates results exceed Nevada water quality standards and/or BLM NPR criteria (3:1).
mg/L = milligrams per liter; n = number samples included in each composite; nd = No data; NNP = net neutralization potential; NPR = neutralization potential ratio; Dep = Deposit; WLW = West Leeville Waste; FCW = Four Corners Waste; TW = Turf Waste; UP = Upper Plate; LP = Lower Plate; Unk = Unknown; Fm = Formation; Ovi = Vinini Fm; SDrm = Roberts Mountains Fm ; Dp = Popovich Fm; Lith = Lithology; CSR = Carbon Sulfide Refractory; UC = Unoxidized Carbonate; Sb = antimony; As = arsenic; Ba = barium; Be = beryllium; Cd = cadmium; Cr = chromium; Cu = copper; Fe = iron; Pb = lead; Mn = manganese; Hg = mercury; Ni = nickel; Se = selenium; Ag = silver; Tl = thallium; Zn = zinc; Cl = chloride; Fl = fluoride; NO_3 = nitrate; CN = cyanide; SO_4 = Sulfate; TDS = Total Dissolved Solids; pH = standard units. Source: Coxon 1997.

TABLE 3-6b
Summary of NCV Data for Waste Rock Units
Leeville Mine Project

Tons	% of Tons	No. Samples		Total Carbon	Organic Carbon	Carbonate Carbon	Total Sulfur	Sulfate Sulfur	Sulfide Sulfur	ANP %$C0_2$	AGP %$C0_2$	ANP/AGP	NCV %$C0_2$	NNP T/kton $CaCO_3$
		Assay	Leco											
West Leeville Upper Plate UC WLW1														
22,100	0.55	59	59	2.67	0.81	1.86	1.36	0.34	1.02	6.83	1.41	4.85	5.42	12.32
West Leeville Upper Plate CSR WLW2														
103,300	2.59	113	113	1.24	0.82	0.42	1.47	0.28	1.20	1.55	-1.64	0.94	-0.09	-0.21
West Leeville Lower Plate UC WLW3														
2,937,300	73.73	119	112	3.20	1.05	2.15	1.20	0.30	0.90	7.90	1.24	6.37	6.64	15.10
Four Corners Lower Plate UC, CSR, UI FCW1														
212,100	5.32	131	88	0.84	0.57	0.27	1.31	0.17	1.14	1.03	1.56	0.66	-0.58	-1.31
Turf Upper Plate UC TW1														
0	0.00	105	105	2.22	0.52	1.70	0.68	0.27	0.41	6.24	0.56	11.06	5.68	12.90
Turf Upper Plate CSR TW2														
15,300	0.38	205	205	1.20	0.85	0.34	1.00	0.31	0.69	1.27	0.94	10.30	0.31	0.71
Turf Lower Plate Dp UC TW3														
125,200	3.14	62	62	3.30	1.75	1.55	2.42	0.34	2.08	5.75	2.85	2.02	2.86	6.49
Turf Lower Plate SDrm UC														
568,700	14.27	36	36	2.44	0.37	2.06	1.36	0.35	1.01	7.59	1.39	5.46	6.19	14.08
Total Waste														
3,984,000	100	830	780											
Run-of-Mine Weighted Average for Ore														
				2.90	0.94	1.97	1.27	0.30	0.97	7.22	1.25	5.76	5.87	13.34
PAG Percent of Total Ore Tonnage														
	11.44													

Notes:
NCV = net carbonate value; ANP = acid neutralizing potential; AGP = acid generating potential; NNP = net neutralizing potential; CO_2 = carbon dioxide; $CaCo_3$ = calcium carbonate; UC = unoxidized carbonate; WLW = West Leeville Waste rock; CSR = carbon sulfide refractory; UI = unoxidized intrusive; FCW = Four Corners Waste rock; TW = Turf Waste rock; Dp = Popovich Formation; SDrm = Roberts Mountains Formation.
Source: Coxon 1997.

Page 3-22; column 1, 1st full paragraph, 1st sentence and last sentence are revised as follows:

"Dewatering from the Gold Quarry Mine began in 1992 and has ranged from 4,000 to 20,000 gpm (9 to 45 cfs), with an expected future rate averaging 20,000 gpm (Figure 3-7)."

"Dewatering at Gold Quarry is expected to continue through 2012."

Page 3-23; Figure 3-5 has been revised to correctly locate the USGS gaging station on Marys Creek. Revised Figure 3-5 is located at the end of this **Errata** chapter.

Page 3-32; 2nd column, 1st paragraph under Marys Creek, 3rd and 4th sentences are revised as follows:

"The USGS has operated a continuous stream gaging station (USGS No. 10322150) on Marys Creek below Carlin Springs since November 1989. Drainage area of Marys Creek above the USGS gaging station (distance of 0.7 mile above confluence with Humboldt River) is 45 square miles (USGS 2000)."

Page 3-39; **Table 3-15** is revised as follows to correct the water quality standards for nitrate and nitrite:

TABLE 3-15
Beneficial Use Water Quality Standards for Humboldt River
at Palisade Gage and Battle Mountain Gage Control Points

Parameter[1] (mg/L, unless specified otherwise)	Water Quality Standards for Beneficial Uses[2]	Most Restrictive Beneficial Use
Temp (°C)	$\Delta T \leq 2^\circ$ C[3]	Aquatic life (warm water fishery)
pH (standard units)	6.5 – 9.0 ΔpH ± 0.5	Water contact recreation; wildlife propagation
Dissolved Oxygen	≥ 5.0	Aquatic life (warm water fishery)
Chlorides	≤ 250	Municipal or domestic supply
Total Phosphorus (as P)	≤ 0.1	Aquatic life (warm water fishery)
Nitrate Nitrite Ammonia (un-ionized)	≤ 10 ≤ 1.0 ≤ 0.02	Municipal or domestic supply
TDS	≤ 500	Municipal or domestic supply
TSS	≤ 80	Aquatic life (warm water fishery)
Sulfate	≤ 250	Municipal or domestic supply
Sodium (SAR)	≤ 8	Irrigation
Color (PCU)	No adverse effects	Municipal or domestic supply
Turbidity (NTU)	≤ 50	Aquatic life (warm water fishery)

[1] mg/L = milligrams per liter; °C = degrees Celsius; P = phosphorous; TDS = total dissolved solids; TSS = total suspended solids; SAR = sodium adsorption ratio; PCU = photoelectric color units; NTU = nephelometric turbidity units. Limits apply from the control point upstream to the next control point.

[2] Δ = change; all values are single-value measurements, except total phosphorus as seasonal average, TDS and SAR as annual averages, and TSS as annual median. ≤ = less than or equal to; ≥ = greater than or equal to

[3] Maximum allowable increase in temperature at the boundary of an approved mixing zone.

Source: Nevada Administrative Code 445A.204-205

Page 3-41; column 2, 2nd paragraph under Springs and Seeps, last sentence, is revised as follows:

"Four springs have been identified within the Leeville Project boundary, whereas approximately 75 springs/seeps have been inventoried along the portion of the Tuscarora Range shown on **Figure 3-10**."

Page 3-53; **Table 3-17** is revised as follows to add well collar elevations:

TABLE 3-17
Monitoring Well Completion and Water Level Elevation Data At the Leeville Project Site

Well No. & Formation	Total Depth (ft)	Screen Interval (ft)	Well Collar Elev. (ft)	Initial GW Elev. (ft)	Initial Measurement Date	Last Monitored Elev. (ft)	Last Measurement Date	Water Level Drawdown to Date (ft)
CG-74 (LP)	2340	2220-2240	6033.84	4961.9	6-20-97	4807.1	9-29-00	154.8
HDP-1D (LP)	1830	1800-1820	5956.51	5213.7	7-19-95	5111.4	3-31-00	102.3
HDP-2S (LP)	1520	1280-1300	6012.32	5057.6	6-23-95	4811.2	9-27-00	246.4
HDP-4 (UP)	500	480-500	6065.43	5804.3	8-8-96	5735.4	9-29-00	68.9
HDP-5 (UP)	1005	980-1000	6028.13	5553.7	8-9-96	5289.0	9-29-00	264.7
HDP-6 (UP)	520	500-520	6026.11	5791.8	8-8-96	5732.1	12-22-00	59.7
HDP-7 (UP)	520	500-520	6044.08	5799.0	8-8-96	5727.1	12-22-00	71.9
HDP-8 (LP)	2100	2030-2050	6070.94	5982.4	1-13-97	NA	NA	NA
HDP-9 (LP)	2940	2890-2930	5827.32	4988.6	1-27-97	5006.7	3-30-00	+18.1
HDP-13S (UP)	2250	1508-1528	6199.00	5789.3	6-23-97	5725.5	9-29-00	63.8
HDP-13D (LP)	2250	2220-2240	6198.60	4960.1	6-24-97	4812.7	9-29-00	147.4
NHD-11 (LP)	1363	1319-1359	5726.64	5458.9	7-7-92	5212.0	6-8-99	246.9
NHD-44 (UP)	1015	995-1015	5829.91	5422.1	8-30-93	5304.6	12-7-00	117.5
NHD-74 (LP)	2000	1979-1999	5922.22	5196.9	10-13-94	4827.5	12-22-00	369.4
NHD-76D (LP)	1869	1849-1869	6093.08	5100.4	10-18-94	4816.2	9-29-00	284.2
NHD-76S (UP)	1869	830-850	6093.08	5789.8	10-13-94	5590.5	9-29-00	199.3
NHD-78 (LP)	1766	1530-1550	6171.40	5079.9	3-8-95	4816.3	9-27-00	263.6
RKP-1S (UP)	1762	720-740	6186.29	5541.5	7-18-95	5647.6	9-27-00	+106.1
RKP-2 (LP)	1550	1528-1548	6189.00	4987.2	12-27-96	4821.1	9-29-00	166.1

Note: See **Figure 3-12** for well locations. UP = upper plate; LP = lower plate; ft = feet; GW = groundwater; Elev. = elevation; NA = not available.

Source: Newmont 2000, 2001.

Page 3-54; **Table 3-18** is revised as follows to add copper, lead, molybdenum, nickel, and silver:

TABLE 3-18
Groundwater Quality in Vicinity of Leeville Project

Parameter[1]	Well HDDW-1A		Well HDDW-2		Well HDDW-3		Standards for Municipal or Domestic Supply[2]
No. of samples	4		4		4		---
Hydrostratigraphic Unit	Lower Plate (Popovich / Roberts Mtn Formations)		Lower Plate (Rodeo Ck / Popovich / Roberts Mtn Formations)		Upper Plate (Vinini Formation)		---
Statistics	Range	Mean / SD[3]	Range	Mean / SD[3]	Range	Mean / SD[3]	---
TDS	233 – 305	266 / 37.1	233 – 321	275 / 44.1	229 - 241	233 / 5.3	500 – [1000]
SC (µmhos/cm)	367 – 372	369 / 2.6	494	494 / NM	NA	NA / NA	---
PH (std units)	7.20 - 8.17	7.9 / 0.47	8.08 – 8.16	8.15 / 0.07	7.83 - 8.07	7.95 / 0.13	5.0 – 9.0
Temperature (° F)	86 – 87	86.5 / NM	67 – 70	68.5 / NM	59 – 63	61 / NM	---
Alkalinity (as HCO$_3$)	137 – 146	140 / 4.1	179 – 185	182 / 3.1	109 – 138	118 / 13.9	---
Calcium (Ca)	39.7 – 42.2	40.4 / 1.2	48.6 – 51.9	49.9 / 1.5	33.0 - 39.0	37.3 / 2.9	---
Sodium (Na)	6.5 – 10	7.5 / 1.7	9.0 - 13.1	10.8 / 1.8	9.0 - 10.4	9.6 / 0.71	---
Magnesium (Mg)	19.1 – 19.5	19.2 / 0.2	18.7 – 20.2	19.5 / 0.7	14.0 - 15.6	14.7 / 0.79	125 – [150] (s)
Potassium (K)	2.9 - 3.0	2.95 / 0.06	3.0 - 4.0	3.43 / 0.42	3.0 - 3.4	3.1 / 0.2	---
Chloride (Cl)	6.9 - 7.7	7.2 / 0.35	8.8 - 12.5	10.5 / 1.52	6.1 - 7.7	6.8 / 0.67	250 – [400]
Fluoride (F)	0.32 – 0.33	0.32 / 0.005	0.79 - 0.84	0.81 / 0.026	0.42 - 0.53	0.45 / 0.05	2.0(s) - 4.0
Sulfate (SO$_4$)	44.6 - 45.5	45 / 0.38	65.0 – 72.2	68.2 / 3.01	62.6 - 70.0	65.8 / 3.2	250 – [500]
Nitrate as NO$_3$-N	<0.02 - <0.10	0.04 / 0.02	<0.10	0.05 / 0	<0.10	0.05 / 0	10
Antimony (Sb)	0.007	0.007 / NM	0.015 - 0.030	0.023 / 0.006	<0.005	0.0025 / 0	0.146
Arsenic (As)	0.057 – 0.068	0.061 / 0.005	0.508 - 0.726	0.628 / 0.104	0.097 - .572	0.348 / 0.22	0.05
Boron (B)	<0.10	0.05 / 0	<0.10	0.05 / 0	<0.10	0.05 / 0	---
Cadmium (Cd)	<0.005	0.0025 / 0	<0.005 - 0.009	0.004 / 0.003	<0.005	0.0025 / 0	0.005
Chromium (Cr)	<0.05	0.025 / 0	<0.05	0.025 / 0	<0.05	0.025 / 0	0.10
Copper (cu)	<0.01	0.005 / 0	<.01	0.005 / 0	<0.01- 0.01	0.0063 / .003	1.3
Iron (Fe)	0.14 - 0.32	0.21 / 0.08	0.37 - 0.39	0.38 / 0.008	0.17 – 4.69	2.25 / 2.14	0.3 – [0.6] (s)
Lead (Pb)	<.005 - <.007	0.0036 / .002	<.005	0.0025 / 0	<.005 - .01	0.0044 / .004	0.05
Manganese (Mg)	<0.01 - 0.01	0.006 / 0.003	0.06 - 0.08	0.068 / 0.01	0.18 – 0.32	0.395 / 0.08	0.05 – [0.10] (s)
Mercury (Hg)	<0.001	0.0005 / 0	<0.001	0.0005 / 0	<0.001	0.0005 / 0	0.002
Molybdenum (Mo)	<.01 - <.10	0.016 / .002	<.01 - .05	0.0188 / .021	<.01 - <.05	0.01 / .01	--
Nickel (Ni)	<.01 – <.05	0.01 / .01	<.01 - .02	0.0125 / .009	<.01 - <.05	0.014 / .01	0.0134
Selenium (Se)	<0.001 - .005	0.0016 / 0.002	<0.001 - 0.004	0.0018 / 0.002	<.001 - .004	0.0018 / 0.0017	0.05
Silver (Ag)	<.005	0.0025 / NM	<.005 - <.01	0.0038 / .001	<.005 - <.01	0.003 / .001	–
Zinc (Zn)	<0.01 - 0.01	0.0075 / 0.003	<0.01 - 0.06	0.0188 / 0.028	0.03 - 0.09	0.05 / 0.028	5.0 (s)

Note: Samples were collected and analyzed during the period April 1996 – August 1997. See **Figure 3-12** for well locations.

[1] All units in milligrams per liter (mg/L) unless otherwise specified. Metals are dissolved concentrations. SC = specific conductance in micromhos per centimeter; TDS = total dissolved solids; NA = not analyzed.

[2] Numbers in brackets [ ] are mandatory secondary standards for public water systems. Values with an (s) are federal secondary drinking water standards. See **Table 3-13** for a listing of water quality standards.

[3] SD = standard deviation; NM = not measured. For statistical purposes, values reported by the laboratory at less than the detection limit were converted to half the specified limit value.

Source: Newmont 1996, 1997b.

Page 4-2; column 2, 5th paragraph under Mining Activities, 1st sentence is revised as follows:

"The largest mine dewatering program in the North Operations Area occurs at the Goldstrike Property where current dewatering rate is approximately 25,000 gpm."

GEOLOGY AND MINERALS

Direct and Indirect Impacts

Page 4-7; 2nd column, beginning with the first full paragraph is revised as follows:

The run-of-mine master ore composite net neutralizing potential (NNP) of 114 T/ktons $CaCO_3$ and neutralization potential ratio (NPR) of 3.6 suggest that the ore would be net neutralizing (**Table 3-5a**). The NCV data indicate that run-of-mine ore would have a NNP of 8.7 T/ktons $CaCO_3$ with a NPR of 4.0 (**Table 3-5b**). Potentially acid generating (PAG) rock has a NPR of less than the BLM standard of 3.0 and the NDEP standard of 1.2 (BLM 1996b).

Ore in the stockpile would be net neutralizing, although it has the potential to be locally acidic. The ore stockpile is temporary and, therefore, would not be capped and reclaimed. Processing alters the geochemistry of ore, so that run-of-mine calculations based on pre-processing ABA or MWMP tests are not meaningful predictors of long-term acid generation or metal release potential for the ore units in the tailing impoundment.

Waste rock production under the Proposed Action is estimated at 3.9 million tons (Newmont 2002a). Tonnage of waste rock to be extracted has been estimated for the life of the project according to rock type (Coxon 1997). These data indicate that approximately 75 percent of the waste rock would be West Leeville lower plate unoxidized carbonate, which is non-PAG based on calculations shown in **Tables 3-6a and 3-6b**. The remaining 25 percent consists of a mix of West Leeville, Four Corners, and Turf deposits, the majority of which is also non-PAG. Based on the NCV data, 12 percent of the waste rock is PAG.

Calculation of a weighted run-of-mine average based on the tonnage of each waste rock type, as it was characterized in NCV analyses summarized in **Table 3-6b**, indicates an overall NNP of 13 T/kton as $CaCO_3$ (NCV = 5.8% CO_2) and a NPR of 5.76. The values measured for composited samples, which are summarized in **Table 3-6b**, indicate more neutralizing conditions, with an NNP of 141 T/kton as $CaCO_3$ and an NPR of 13. Waste rock meets pertinent regulatory criteria on a run-of-mine basis based on calculation using either composite ABA or individual NCV data. The observed NPR for the NCV data set agrees closely with the results reported for the run-of-mine master composite sample. Operational sampling during development and exploration would be used to monitor waste rock to verify baseline geochemistry as well as to identify PAG rock.

Table 4-4 also summarizes average metal mobility values, calculated for the MWMP results using waste rock tonnage. These results indicate that seepage from run-of-mine waste rock would exceed drinking water quality standards for antimony (Sb), arsenic (As), manganese (Mn), nickel (Ni), selenium (Se), sulfate and total dissolved solids (TDS).

TABLE 4-4
Run-of-Mine Waste Rock MWMP Characteristics
Leeville Mine Project

	Nevada Water Standards (mg/L)	Weighted Average MWMP for ROM Waste Rock (mg/L)
Metals		
Antimony (Sb)	0.146	1.195
Arsenic (As)	0.05	0.15
Barium (Ba)	2.0	0.02
Beryllium (Be)	0.004*	0.001
Cadmium (Cd)	0.005	0.003
Chromium (Cr)	0.1	0.006
Copper (Cu)	1.3*	0.004
Iron (Fe)	0.3* (s)	0.04
Lead (Pb)	0.05	0.0025
Manganese (Mn)	0.05* (s)	0.17
Mercury (Hg)	0.002	0.0002
Nickel (Ni)	0.0134	0.3626
Selenium (Se)	0.05	0.08
Silver (Ag)	—	0.008
Thallium (Tl)	0.013	0.009
Zinc (Zn)	5.0* (s)	0.27
Non-Metals		
Chloride (Cl)	250	6.8
Fluoride (Fl)	4.0*	0.5
Nitrate (NO_3)	10	0.09
Cyanide (CN)	0.2	0.01
Sulfate (SO_4)	250	832
Total Dissolved Solids (TDS)	500	1417
pH	5.0-9.0 standard units	--

Notes:
Nevada water quality standards are the "Municipal or Domestic Supply" values listed on **Table 3-13**; if no corresponding state standard exists, the federal drinking water standard is used and denoted by an asterisk (*). Values with (s) are secondary drinking water standard.
MWMP = meteoric water mobility procedure; ROM = run-of-mine; mg/L = milligrams per liter

Source: Coxon 1997

Newmont has developed guidelines for storage and disposal of PAG and rock material, including waste rock and ore, that have potential to release metals (Newmont 1995). The objective of the guidelines is to minimize potential for acid drainage by controlling the acid generation process. Control measures for waste rock and stockpiled ore include: 1) placing PAG rock on a base constructed of compacted low permeability materials designed to minimize leaching to groundwater; 2) segregating and/or mixing PAG rock; 3) encapsulating PAG rock within acid-neutralizing rock (NNP greater than 40 T/kton $CaCO_3$); 4) sloping and wheel compacting lift surfaces; 5) controlling surface water to minimize infiltration; 6) encapsulating and capping PAG rock during reclamation; and 7) reclaiming the waste rock disposal facility.

Waste rock would be selectively handled to isolate and encapsulate PAG rock under the Proposed Action. Data indicate the total mass of waste rock to be generated over the Project life would be non-PAG. However, of this total mass, concentrated volumes of PAG rock would be produced at specific points in the mining sequence. An estimated 212,100 tons of Four Corners waste rock that is PAG would be generated between 2003 and 2010, and another 103,300 tons of West Leeville waste rock that is PAG would be generated in 2002 and 2003.

PAG waste rock would be identified based on net acid generation potential using visual classification with verification by NCV analysis, as defined in the Refractory Ore and Waste Rock Management Plan (Newmont 1995). PAG waste rock would be encapsulated with rock having a high net neutralization potential (NNP > 40 T/kton $CaCO_3$) in order to neutralize acid generated by the waste rock. The waste rock facility would be constructed on a low permeability base to inhibit leaching of metals into groundwater. At closure, the waste rock facility would be capped with 24-inches of topsoil or other suitable growth medium and revegetated to minimize potential infiltration. Additional information about the design of the Waste Rock Disposal Facility is contained on pages 3-1 and 3-2 of this Errata chapter under the revision to page 2-20.

Use of these management strategies would reduce potential for oxidation in all run-of-mine waste rock, but particularly for encapsulated PAG. These strategies would thereby reduce potential acid and metal release below values conservatively predicted by static tests, which are based on the assumption of complete oxidation of all sulfide minerals.

The proposed Plan of Operations states that most mined out stopes would be backfilled with cemented rock fill (Newmont 2002a). Access levels, excavations for underground facilities, and shafts would not be backfilled. Backfill would consist of neutral or acid-neutralizing material from existing open pit operations in the area or Project waste rock.

Methods of post-mining waste rock facility reclamation have been proposed by Newmont (2002a), but will be finalized in the Closure Plan after numerical modeling of waste rock disposal facility. These methods include regrading and revegetating the waste rock facility and diverting run-on surface water. These actions would stabilize the facilities and simultaneously limit infiltration and erosion. Quarterly inspection of refractory ore stockpiles and the waste rock disposal facility would be conducted for signs of acid rock drainage (ARD) production and to ensure integrity of the cover and surface water management systems.

Any disruption to mine facilities and workings from seismic activity would be from liquefaction or ground rupture. Liquefaction occurs when seismic shaking causes earth material to lose its inherent strength and behave like a liquid. In general, liquefaction can occur where earth material is fully saturated, loose, unconsolidated, and/or sandy. Surface or underground rupture may occur along an active fault trace during an earthquake. Underground workings are typically designed to withstand pressures exerted by the overlying mass of rock. These design criteria are typically much greater than ground shaking or acceleration stresses exerted by earthquakes.

Page 4-8; Table 4-3 of the Draft EIS has been deleted.

Page 4-24; **Table 4-5** is revised as follows to add copper, lead, molybdenum, nickel, and silver:

TABLE 4-5
Representative Groundwater Quality for Dewatering at Leeville Project

Parameter[1]	Well HDDW-1A[3]	Well HDDW-2[3]	Combined Wells[4]	Aquatic Life Standards[5]	Nevada Standards for Municipal or Domestic Supply[6]
Number of Samples	4	4	8	---	---
Pumping Rate (gpm)[2]	18,000	2,000	20,000	---	---
Est. % of Total Water	90%	10%	100%	---	---
Hydrostratigraphic Unit	Lower Plate	Lower Plate	---	---	---
TDS[2]	305	321	307	---	500 - [1000]
pH (std units)	8.09 – 8.17	8.08 – 8.16	---	6.5 – 9.0	5.0 – 9.0
Temperature (°F)	86 – 87	67 – 70	---	ss[5]	---
Alkalinity (as HCO_3)	170	185	172	---	---
Calcium (Ca)	42.2	51.9	43.2	---	---
Sodium (Na)	10	13.1	10.3	---	---
Magnesium (Mg)	19.5	20.2	19.6	---	---
Potassium (K)	3.0	4.0	3.1	---	---
Chloride (Cl)	7.7	12.5	8.2	---	250 - [400]
Fluoride (Fl)	0.33	0.84	0.38	---	---
Sulfate (SO_4)	45.5	72.2	48.2	---	250 - [500]
Nitrate (NO_3)	<0.10	<0.10	<0.10	90 / 90	10
Antimony (Sb)	0.007	0.030	0.009	---	0.146
Arsenic (As)	0.068	0.726	0.134	0.342 / 0.18	0.05
Boron (B)	<0.10	<0.10	<0.10	---	---
Cadmium (Cd)	<0.005	0.009	0.003*	0.0053 / 0.0013	0.005
Chromium (Cr)	<0.05	<0.05	<0.05	0.015 / 0.01	0.10
Copper (Cu)	<0.01	<0.01	<0.01	0.0221 / 0.0142	1.3
Iron (Fe)	0.32	0.39	0.33	1.0 / 1.0	0.3 - [0.6] (s)
Lead (Pb)	<0.007	<0.005	<0.007	0.0684 / 0.0013	0.05
Manganese (Mn)	0.01	0.08	0.02	---	0.05 - [0.1] (s)
Mercury (Hg)	<0.001	<0.001	<0.001	0.002 / 0.000012	0.002
Molybdenum (Mo)	<0.10	0.05	0.05*	0.019 / 0.019	--
Nickel (Ni)	<0.05	0.02	0.02*	1.699 / 0.189	0.0134
Selenium (Se)	0.005	0.004	0.005	0.02 / 0.005	0.05
Silver (Ag)	<0.005	<0.01	<0.01	0.0069 / 0.0069	--
Zinc (Zn)	0.01	0.06	0.02	0.14 / 0.127	5.0 (s)

[1] All units in milligrams per liter (mg/L) unless otherwise specified. Metals are dissolved concentrations.

[2] TDS = total dissolved solids; gpm = gallons per minute.

[3] Samples were collected during the period of April 1996 – August 1997; values on table are the highest concentrations measured (see **Table 3-18** for range, mean, and standard deviation values).

[4] Results of groundwater mixing are based on 90% from well HDDW-1A and 10% from well HDDW-2 as recommended by Paul Pettit of Newmont (personal communication); the values with an asterisk (*) indicate that the less than detection value was set at half the value for calculating a resultant concentration.

[5] See **Table 3-13** for listing of aquatic life standards; first value is the 1-hour average standard (propagation) and the second value is the 96-hour average standard (put and take). ss = site-specific determination for water temperature.

[6] See **Table 3-13** for listing of water quality standards; numbers in brackets [ ] are mandatory secondary standards for public water systems; (s) indicates federal secondary drinking water standard.

Source: Newmont 1997b.

Table 4-7 is a new table to be included in the document in response to public comments:

TABLE 4-7
SUMMARY OF CUMULATIVE MINE DEWATERING RATES IN THE CARLIN TREND

Year	Dewatering Rate (gpm) at Mine Site			Cumulative Pumping Rate (gpm)
	Goldstrike Property (Betze/Post & Meikle Mines)	Gold Quarry Mine	Leeville Mine	
1990	10,000	0	0	10,000
1991	25,000	0	0	25,000
1992	43,000	3,000	0	46,000
1993	67,000	6,000	0	73,000
1994	69,000	16,000	0	85,000
1995	58,000	15,000	0	73,000
1996	10,000	12,000	0	22,000
1997	35,000	16,000	0	51,000
1998	66,000	19,000	0	85,000
1999	45,000	11,000	0	56,000
2000	32,000	11,000	0	43,000
2001	26,000	7,000	0	33,000
2002	23,000	17,000	25,000	65,000
2003	21,000	25,000	25,000	73,000
2004	21,000	20,000	25,000	66,000
2005	20,000	20,000	18,000	58,000
2006	20,000	20,000	18,000	58,000
2007	19,000	20,000	13,000	52,000
2008	19,000	20,000	12,000	51,000
2009	18,000	20,000	11,000	49,000
2010	18,000	20,000	10,000	48,000
2011	---	20,000	9,000	29,000
2012	---	20,000	9,000	29,000
2013	---	---	9,000	9,000
2014	---	---	9,000	9,000
2015	---	---	9,000	9,000
2016	---	---	9,000	9,000
2017	---	---	9,000	9,000
2018	---	---	9,000	9,000
2019	---	---	9,000	9,000

Note: gpm = gallons per minute; see **Figure 3-7** in the Draft EIS for graphical presentation of pumping rates. At the end of the primary dewatering period shown above for each mine, some groundwater pumping will continue at rates of several hundred gpm for several years for purposes of mine closure and reclamation.

TABLE 1
Statistical Summary by Waste Rock Type
Leeville Mine Project

Tons	% by Weight	No. Samples Leco		Total Carbon	Organic Carbon	Carbonate Carbon	Total Sulfur	Sulfate Sulfur	Sulfide Sulfur	ANP %CO_2	AGP % CO_2	ANP/AGP	NCV %CO_2	NNP t/kton $CaCO_3$
West Leeville Upper Plate UC (WLW1)														
22,100	0.55%	59	Min	0.48	0.00	0.39	0.40	0.00	0.05	1.43	0.07	0.81	-0.48	-1.09
			Max	6.13	3.10	5.29	3.26	0.64	2.90	19.40	3.99	118.01	19.21	43.65
			Median	2.54	0.44	1.71	1.24	0.34	0.92	6.27	1.27	4.20	3.73	8.47
			Mean	2.67	0.81	1.86	1.36	0.34	1.02	6.83	1.41	4.85	5.42	12.32
West Leeville Upper Plate CSR (WLW2)														
103,300	2.59%	113	Min	0.27	0.07	-0.21	0.04	0.07	-0.10	-0.77	-4.10	0.19	-3.43	-7.80
			Max	3.19	2.18	1.62	3.37	0.56	2.98	5.94	0.14	43.20	4.52	10.28
			Median	1.21	0.72	0.29	1.45	0.26	1.14	1.06	-1.57	0.68	-0.21	-0.48
			Mean	1.24	0.82	0.42	1.47	0.28	1.20	1.55	-1.64	0.94	-0.09	-0.21
West Leeville Lower UC (WLW3)														
2,937,300	73.73%	112	Min	0.19	0.03	-0.12	0.50	0.05	0.30	0.04	0.41	0.02	-2.83	-6.43
			Max	11.04	6.38	8.20	2.75	1.38	2.55	30.09	3.51	56.39	29.55	67.16
			Median	2.95	0.57	1.85	1.16	0.24	0.82	6.78	1.12	6.04	5.66	12.86
			Mean	3.20	1.05	2.15	1.20	0.30	0.90	7.90	1.24	6.37	6.64	15.10
Four Corners Lower Plate Mixed UC, CSR, UI (FCW1)														
212,100	5.32%	88	Min	0.03	0.00	-0.06	0.12	-0.01	0.05	0.00	0.07	0.00	-8.20	-18.63
			Max	7.06	4.82	4.41	6.82	0.68	6.25	16.18	8.56	236.27	16.12	36.63
			Median	0.45	0.16	0.07	1.14	0.16	0.98	0.26	1.34	0.21	-0.77	-1.75
			Mean	0.84	0.57	0.27	1.31	0.17	1.14	1.03	1.56	0.66	-0.58	-1.31
Turf Shaft Site Upper Plate UC (TW1)														
0	0.00%	105	Min	0.08	0.07	-0.05	0.01	0.04	-0.03	0.18	0.03	1.15	-0.14	-0.32
			Max	7.50	4.56	4.20	2.56	1.70	2.17	15.41	2.97	342.89	15.07	34.25
			Median	2.08	0.36	1.63	0.52	0.20	0.32	5.98	0.44	12.92	5.48	12.45
			Mean	2.22	0.52	1.70	0.68	0.27	0.41	6.24	0.56	11.06	5.68	12.90
Turf Shaft Site Upper Plate CSR (TW2)														
15,300	0.38%	205	Min	0.01	-0.01	-0.21	0.01	0.01	-0.08	0.04	0.01	0.04	-2.02	-4.60
			Max	3.37	3.15	1.40	3.19	2.11	2.86	5.14	3.92	219.66	3.33	7.56
			Median	1.28	0.80	0.31	1.01	0.17	0.69	1.14	0.90	1.54	0.14	0.31
			Mean	1.20	0.85	0.34	1.00	0.31	0.69	1.27	0.94	10.30	0.31	0.71
Turf Lower Plate Dp UC (TW3)														
125,200	3.14%	62	Min	0.03	0.01	-0.12	0.36	0.04	0.14	0.01	0.19	0.00	-7.96	-18.09
			Max	12.41	5.52	7.56	6.15	1.10	6.05	27.75	8.29	116.19	26.59	60.44
			Median	2.49	1.21	0.18	1.93	0.23	1.61	0.64	2.21	0.28	-0.98	-2.23
			Mean	3.30	1.75	1.55	2.42	0.34	2.08	5.75	2.85	2.02	2.86	6.49
Turf Lower Plate SDrm UC (TW4, 5, and 6)														
568,700	14.27%	36	Min	0.08	0.01	-0.05	0.01	0.01	-0.09	0.00	0.01	0.00	-6.95	-15.79
			Max	8.48	1.92	8.41	5.20	1.10	5.07	30.86	6.95	1896.61	30.82	70.05
			Median	2.05	0.16	1.37	1.15	0.22	0.76	5.03	1.04	7.01	4.76	10.82
			Mean	2.44	0.37	2.06	1.36	0.35	1.01	7.59	1.39	5.46	6.19	14.08
Turf Lower Plate Ovi CSR														
0	0	8	Min	0.74	0.02	0.42	0.57	0.36	0.05	1.54	0.07	1.60	1.16	2.63
			Max	2.97	1.43	2.28	2.65	0.57	2.08	8.37	2.85	45.00	7.44	16.90
			Median	1.01	0.50	0.84	0.65	0.52	0.15	3.08	0.21	13.26	2.29	5.20
			Mean	1.49	0.57	0.93	0.94	0.50	0.45	3.39	0.61	5.57	2.79	6.33
Turf Lower Plate UI														
0	0	6	Min	0.86	0.00	0.79	0.50	0.17	0.33	2.90	0.45	0.60	-1.94	-4.40
			Max	1.61	0.07	1.61	3.90	0.93	3.53	5.91	4.84	13.07	5.46	12.40
			Median	1.20	0.02	1.16	2.02	0.42	1.32	4.26	1.80	3.72	2.40	5.45
			Mean	1.25	0.02	1.23	1.94	0.53	1.41	4.50	1.93	2.33	1.93	4.39
Turf Lower Plate Drc CSR														
0	0	8	Min	0.28	0.12	0.06	1.08	0.04	0.82	0.22	1.12	0.16	-2.70	-6.13
			Max	2.40	2.01	0.44	2.51	0.30	2.37	1.61	3.25	1.35	0.42	0.96
			Median	1.95	1.78	0.18	1.31	0.14	1.14	0.66	1.56	0.35	-1.16	-2.63
			Mean	1.88	1.65	0.23	1.51	0.17	1.34	0.83	1.83	0.45	-1.00	-2.28
TOTAL														
3,984,000	100%	802	Median	2.62	0.51	1.59	1.19	0.23	0.85	5.82	1.09	5.52	4.79	10.89
			Mean	2.90	0.97	1.94	1.27	0.30	0.97	7.22	1.25	5.66	5.87	13.34
TOTAL IN ORE														
		143												
TOTAL IN ORE AND WASTE														
		945												
TOTAL IN WASTE MWMP COMPOSITES														
		675												
PAG														
	11.44%													

Notes: ANP = acid-neutralizing potential; AGP = acid-generating potential; NCV = net carbonate value; NNP = net-neutralization potential; CO_2 = carbon dioxide; $CaCO_3$ = calcium carbonate; UC = unoxidized carbonate; CSR = carbon sulfide refractory; UI = unoxidized intrusive; WLW = West Leeville waste; FCW = Four Corners waste; TW = Turf waste; Dp = Popovich Formation; Ovi = Vinini Formation; SDrm = Roberts Mountains Formation..

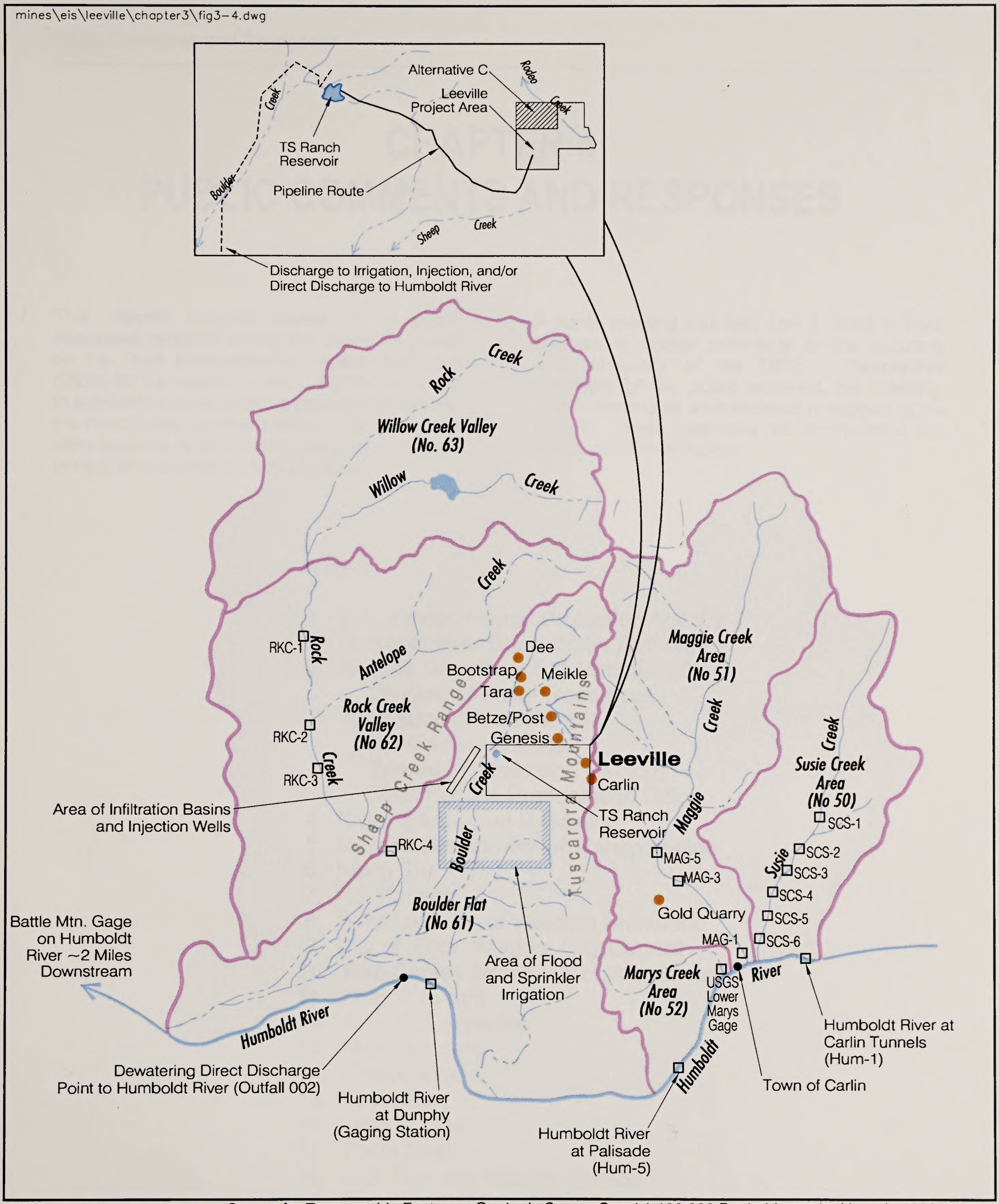
Source: Coxon 1997

TABLE 2
Statistical Summary by Ore Type
Leeville Mine Project

% by Weight	No. Samples			Total Carbon	Organic Carbon	Carbonate Carbon	Total Sulfur	Roast Sulfur	Sulfide Sulfur	ANP %CO_2	AGP % CO_2	ANP/AGP	NCV %CO_2	NNP t/kton $CaCO_3$
	Assay	Leco												
West Leeville Lower UC SDrm Ore														
60.5%	65	65	Min	1.08	0.19	0.43	0.47	0.07	0.40	1.58	0.55	0.98	-0.03	-0.07
			Max	4.93	1.07	4.51	2.41	0.37	2.11	16.54	2.90	17.28	15.48	35.18
			Median	2.74	0.46	2.22	1.30	0.25	1.09	8.14	1.50	5.51	6.57	14.94
			Mean	3.06	0.51	2.55	1.35	0.25	1.09	9.35	1.50	6.22	7.85	17.83
Four Corners Lower CSR Ore														
6.7%	48	48	Min	0.04	0.03	-0.04	1.12	0.05	1.04	0.00	0.00	0.00	-18.55	-42.15
			Max	1.90	1.90	0.43	14.20	0.54	13.66	1.59	18.71	0.46	-1.39	-3.17
			Median	0.15	0.11	0.02	2.87	0.14	2.49	0.10	3.09	0.03	-3.06	-6.95
			Mean	0.30	0.26	0.04	3.15	0.19	2.99	0.19	4.10	0.05	-3.91	-8.89
Turf Ore														
32.8%	30	30	Min	0.08	0.01	-0.07	1.42	0.12	0.82	-0.26	1.12	0.23	-8.70	-19.77
			Max	7.13	5.06	2.25	6.90	0.77	6.51	8.26	8.92	0.93	6.55	14.88
			Median	0.82	0.20	0.29	2.28	0.39	1.86	1.06	2.55	0.42	-1.46	-3.31
			Mean	2.97	1.58	1.38	6.09	0.90	5.20	5.08	7.12	0.71	-2.04	-4.63
TOTAL SAMPLES														
	143	143	Mean	2.85	0.85	2.00	3.02	0.46	2.57	7.34	3.52	4.00	3.82	8.67

Notes: ANP = acid-neutralizing potential; AGP = acid-generating potential; NCV = net carbonate value; NNP = net-neutralization potential; CO_2 = carbon dioxide; $CaCO_3$ = calcium carbonate; UC = unoxidized carbonate; CSR = carbon sulfide refractory; SDrm = Roberts Mountains Formation.

Source: Coxon 1997


mines\eis\leeville\chapter3\fig3-4.dwg
Alternative C
Leeville Project Area
Rodeo Creek
Creek
Boulder
TS Ranch Reservoir
Pipeline Route
Sheep Creek
Discharge to Irrigation, Injection, and/or Direct Discharge to Humboldt River
Rock Creek
Willow Creek Valley (No. 63)
Willow Creek
Creek
Antelope
Rock Creek
RKC-1
RKC-2
RKC-3
Rock Creek Valley (No 62)
Sheep Creek Range
Dee
Bootstrap
Meikle
Tara
Betze/Post
Genesis
Tuscarora Mountains
Leeville
Carlin
TS Ranch Reservoir
Creek
Area of Infiltration Basins and Injection Wells
RKC-4
Boulder
Boulder Flat (No 61)
Area of Flood and Sprinkler Irrigation
Maggie Creek Area (No 51)
Creek
Maggie
MAG-5
MAG-3
Gold Quarry
MAG-1
Susie Creek Area (No 50)
Creek
Susie
SCS-1
SCS-2
SCS-3
SCS-4
SCS-5
SCS-6
Marys Creek Area (No 52)
USGS Lower Marys Gage
River
Humboldt
Battle Mtn. Gage on Humboldt River ~2 Miles Downstream
Humboldt River
Dewatering Direct Discharge Point to Humboldt River (Outfall 002)
Humboldt River at Dunphy (Gaging Station)
Humboldt River at Palisade (Hum-5)
Town of Carlin
Humboldt River at Carlin Tunnels (Hum-1)

Source for Topographic Features: Geologic Survey Quad 1:100,000 Battle Mountain, Nevada 1988

N

0 Miles 10

— Hydrographic Basin Boundary and Number

● Mine / Proposed Mine

☐ Surface Water Monitoring Station

Regional Surface Water Drainages
Leeville Project
FIGURE 3-5

CHAPTER 4
PUBLIC COMMENTS AND RESPONSES

This chapter includes copies of all public comments received during the comment period on the Draft Environmental Impact Statement (DEIS) for the Leeville Project. BLM's responses to substantive comments are provided adjacent to the reproduced comment letters. Twenty letters were received by BLM during the public comment period, which ended on April 29, 2002.

A public meeting was held April 3, 2002 in Elko, Nevada, to accept comments on the accuracy and adequacy of the DEIS. Twenty-five members of the public attended the meeting. Seven comments were received in support of the project. These comments are incorporated into letters 11-17 listed below.

Letters

1. U.S. Environmental Protection Agency
2. Humbolt River Basin Water Authority
3. Nevada Department of Administration
    Division of Water Resources
    Division of Wildlife
    Division of Minerals
    Bureau of Mines and Geology
    State Historic Preservation Office
4. Natives Impacted By Mining
5. Nevada Department of Transportation
6. Kevin Sur
7. F.J. Pattani
8. Te-Moak Tribe of Western Shoshone
9. City of Elko, Nevada, City Council
10. Elko County Board of Commissioners
11. Sharon Byram
12. John C. Carpenter
13. Mark Sanders
14. Charlie Myers
15. Kevin Sur
16. Jette C. Seal
17. Thom Seal
18. U.S. Fish and Wildlife Service
19. Great Basin Mine Watch
20. Thom and Jette Seal

Letter 1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105-3901

[illegible] -2 [illegible] 7: 30

April 29, 2002

Deb McFarlane
Bureau of Land Management
Elko Field Office
3900 Idaho Street
Elko, NV 89801

Dear Ms. McFarlane:

The U.S. Environmental Protection Agency (EPA) has reviewed the **Leeville Project Draft Environmental Impact Statement (DEIS)**, Eureka County, Nevada **[CEQ # 020073]**. Our review and comments on this DEIS are provided pursuant to the National Environmental Policy Act (NEPA), the Council on Environmental Quality's NEPA Implementation Regulations at 40 CFR 1500-1508, and Clean Air Act Section 309.

The DEIS evaluates alternatives for developing and operating an underground gold mine for eighteen years approximately 20 miles northwest of Carlin, Nevada. The proposed project would disturb approximately 486 acres of land, and includes five shafts to depths of about 2,500 feet to access three ore bodies, a waste rock disposal facility, a refractory ore stockpile, facilities to support backfill of mined-out stopes, dewatering wells, a water treatment plant, a pipeline/canal system to discharge excess mine water to existing infiltration and irrigation systems in Boulder Valley, and reclamation activities. Alternatives to the Proposed Action include the No Action Alternative, Alternative A - eliminate canal portion of water discharge pipelines, Alternative B - backfill shafts, and Alternative C - relocation of the waste rock disposal facility and refractory ore stockpile. The Agency Preferred Alternative incorporates alternatives A, B, and C into the proposed action, which would result in further protection of environmental resources. EPA commends BLM in its efforts to reduce impacts from the proposed project, particularly in light of the enormous cumulative environmental impacts to resources in the project area.

Based on our review of the DEIS, we have concerns regarding potential impacts that should be avoided in order to fully protect the environment. We are concerned that site geochemistry indicates the need for a carefully controlled waste rock handling and disposal program and make recommendations to ensure against adverse impacts to surface water and groundwater from site facilities such as the waste rock pile, stockpiles, and roads. We are also concerned about the enormous cumulative impacts that this and other nearby mining projects have had and will continue to have on regional water resources, and believe a grouting program should be further assessed in the interest of reducing mine dewatering impacts if possible. In addition, the DEIS does not contain sufficient information for EPA to fully assess environmental

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Comments

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impacts that should be avoided in order to fully protect the environment. We recommend that the Final Environmental Impact Statement (FEIS) include additional information regarding site geochemistry, impacts to air and water quality, mitigation measures, cumulative impacts, and bonding. We also recommend additional information regarding an alternative that could reduce the need for mine dewatering, thereby reducing or eliminating some potential project impacts. Our detailed comments are enclosed. Based on our concerns and the need for additional information, we have rated this DEIS as EC-2 – Environmental Concerns-Insufficient Information (see our enclosed "Summary of Rating Definitions and Follow Up Actions").

We appreciate the opportunity to review this DEIS. Please send a copy of the FEIS to this office when it is officially filed with our Washington, D.C., office. If you have any questions, please call me at (415)972-3854 or Jeanne Geselbracht at (415) 972-3853.

Sincerely,

Lisa B. Hanf

Lisa B. Hanf, Manager
Federal Activities Office

002912

Enclosures

cc: Dave Gaskin, NDEP
Stanley Wiemeyer, U.S. Fish & Wildlife Service - Reno

Leeville Project DEIS
EPA Comments - April, 2002

Project Alternatives

1-1 The BLM preferred alternative includes adding to the proposed action alternatives A, B, and C, which would result in further protection of environmental resources, including reduced surface disturbance and reduced impacts to terrestrial wildlife, vegetation, and soils. EPA commends BLM in its efforts to reduce impacts from the proposed project, particularly in light of the enormous cumulative environmental impacts to resources in the project area.

Responses

Response 1-1

Comment noted.

Comments

We encourage BLM to further pursue efforts to reduce the enormous cumulative impacts to
groundwater resources resulting from the Leeville Mine and other nearby mines. The DEIS (p. 2-
46) identifies an alternative for grouting underground mine workings which could reduce the
amount of dewatering and dewatering discharge for the project. BLM eliminated this alternative
from further analysis based on feasibility and safety considerations. Given the significant
impacts of dewatering already resulting from existing mine operations in the area and the
additional dewatering impacts that would result from the Leeville project, an alternative that
1-2 would reduce dewatering requirements could provide a significant advantage over the current
dewatering proposal. The FEIS should provide additional information to support the specific
feasibility issues and safety risks of grouting at the Leeville Mine and include a discussion of the
successful use of grouting at other mines. The FEIS should also evaluate the potential amount by
1-3 which dewatering could be reduced by a grouting program at the mine and describe and discuss
the potential adverse and beneficial impacts of such a program there.

Responses

Response 1-2

The U.S. Bureau of Land Management (BLM) recognizes that pressure grouting techniques have application in specific mine sites or industrial sites where conditions are appropriate for this technology. These sites include open pit mines, underground mines, tailing impoundment sites, and industrial pond locations. Grouting techniques applied to mining operations may include installation of shallow seepage barriers or cutoff walls, grout curtains, and discreet fracture filling in underground settings.

Establishment of a grout curtain to effectively decrease groundwater inflow to mine workings would be difficult, if not impossible, to construct in the Leeville Project area. As described by Herbert (1998), conditions that affect the success of a grouting program can include cross permeability, clay infilling of fractures, directional control of drill holes used for grouting, missed conduits for groundwater flow, effects of shock waves from explosives used during mining, seismic activity, subsidence adjacent to underground workings, excess pressures resulting in hydrofraction, adjacent cones of depression, placement of instrumentation to measure water pressures to assure safe operations within the grout curtain, and cost. All of these conditions are present at the Leeville Project site (Herbert 1998).

The suggested placement of the grout curtain would encompass an area of approximately 1 square mile, and require placement of grout above, below and around all of the proposed underground workings. Aquifer testing has shown that the rock in which the main portion of the mine and grout curtain would be constructed has a relatively high hydraulic conductivity of approximately 100 feet/day.

The BLM has determined that, based on the conditions present in the Leeville Project area, and in consideration of the limitations described above, the potential of significant risk to human health and safety, and the predicted limited additive effect of Leeville Project dewatering in combination with existing dewatering in the Carlin Trend, grouting would not be a feasible technology to replace mine dewatering at the Leeville Mine.

Newmont has proposed to use pressure grouting techniques within Upper Plate rocks should it become necessary during construction of the shafts in the Leeville Project. Grouting would be used to control discreet fracture flow where the volume of flow impedes shaft sinking activity. Grout placement in this circumstance is done in a relatively small area (around the shafts within the Upper Plate). Pressure grouting is feasible in Upper Plate rock because its hydraulic conductivity is sufficiently low. Also see response 19-21.

Response 1-3

Given the infeasibility of completing an effective grouting program that would have a measurable effect on groundwater inflow to the proposed mine development at the Leeville Project, it is not possible to quantify potential reduction in dewatering needs.

Comments

Mining Waste Management and Land Reclamation

1-4 According to Table 3-5 in the DEIS, numerous samples collected from drill cuttings were composited for each of nine laboratory samples to conduct acid-base accounting (ABA). Only nine composited samples represent the waste rock for the entire project, and it is unclear whether samples taken are representative of the physical and geochemical characteristics of each type of material, including homogeneity, relative amounts, and particle size distribution. In addition, the sulfur content and sulfur species of the rock types are not provided for these units.

Responses

Response 1-4

The acid-base account (ABA) data presented for nine waste rock composites in the Draft EIS do not stand alone in characterizing waste rock for the entire Leeville Project. Those analyses represent ABA test results for composite samples, developed to represent the bulk geochemistry of each waste rock and ore unit. A total of 945 analyses of acid generation potential (NCV method by Leco) were run prior to development of the composite samples, as discussed below.

Geochemical characterization of Leeville Project deposits began as part of an exploration program, and as such, several generations of sampling and analysis were completed over time, which have contributed to the confusion indicated by the commenter. In response to this question, BLM has revised the Mine Rock Characterization section of the EIS to clarify the level of sampling and analysis that supports conclusions presented in the EIS (see **Errata** in Chapter 3 of the FEIS).

The revised Mine Rock Characterization section indicates that 973 intervals were collected from drill cuttings to characterize environmental geochemistry. Samples included waste rock and ore selected throughout the Turf, West Leeville, and Four Corners deposits based on geologic description of drill cuttings to identify carbonate, sulfide, or metal bearing mineralization. Most of the 973 samples (923 intervals) were analyzed by NCV Leco for carbon and sulfur content, as discussed below. Results of these analyses were summarized qualitatively on page 3-11 in the DEIS, to simplify presentation of the large volume of data involved (see also **Table 3-5b** and **Table 3-6b** in **Errata** section of Chapter 3 of the FEIS). Although conclusions presented in the DEIS have not changed, additional data on the NCV analyses for waste rock have been provided to further support impact descriptions (see revised Mine Rock Characterization in **Errata**).

Material remaining from the 973 samples was composited into the broader waste rock types shown in revised **Table 3-3** (see **Errata**). This approach was taken to facilitate correlation of metal mobility test results and acid base potential characteristics with material groups that could be managed (i.e., handled separately) on an operational basis. Composites were developed by Newmont geologists based on geologic and mineralogic characteristics including NCV data, carbon content, plate location, and lithology. Ten waste rock composites three ore composites and two master waste and ore composites were developed for MWMP testing with additional ABA analysis (see **Table 3-5a** and **Table 3-6a - Errata**). The number of samples chosen for each composite was based on mineralization and lithology, rather than tonnage, so that less frequent rock types with more variable mineralization could be represented by a greater number of samples; all intervals included in composites were weighted equally. Of the composited intervals, 830 were waste rock and 143 were ore. Because of some variance in the length of intervals represented in samples included in the composites, 780 samples (representing 830 intervals) of waste rock and 143 samples of ore were analyzed individually for AGP potential using the Net Carbonate Value (NCV) test method. Sulfur forms were analyzed using Leco furnace to measure total sulfur, sulfate sulfur, and sulfide sulfur. Total carbon, carbonate, and organic carbon species were also determined by Leco methods. The AGP was calculated based on sulfide sulfur content. The NCV method is analogous to the ABA method, although results are reported in %CO_2, rather than as tons/kton $CaCO_3$. See **Table 1** *Statistical Summary by Waste Rock Type* and **Table 2** *Statistical Summary by Ore Type* located at the end of this section.

Results of the NCV testing, as summarized in the DEIS indicate that Four Corners rock is potentially acid generating (PAG) and that with the exception of minor carbon sulfide refractory waste units (WLW2, TW2, and TW3), West Leeville and Turf deposits are net neutralizing. These PAG units represent 11.4% of the total waste rock. Similarly, the NCV analyses for ore indicate that while the Four Corners ore is PAG, West Leeville and Turf ores are net neutralizing.

In addition to the LECO analyses, a third party petrologic study on the alteration and mineralization of the West Leeville deposit was completed (Leach 2000). In that study pyrite (FeS_2), with trace amounts of arsenopyrite (FeAsS), marcasite (FeS_2), stibnite (Sb_2S_3), sphalerite (ZnS), and molybdenite (MoS_2) were identified. This suite of mineralization is inferred to occur in the Turf and Four Corners deposits as well.

There are no specific records concerning particle size of samples. Original samples were reverse circulation drill cuttings, which typically range in size from ¼ inch to 1 inch in diameter. Size range varies depending upon rock type and drilling practice. Samples were split using conventional subsampling techniques to prevent particle size bias. Leco analysis and fire assays require a small particle size (sub-100 mesh) for analysis; a representative split of the cuttings would have been collected and ground to meet test requirements. The established protocol for MWMP analysis requires sub-2 inch material, and also requires that the sub-200 mesh fraction be measured prior to testing. Results reported by Silver Valley Labs (SVL) indicated that the sub-200 mesh fraction in MWMP samples tested for Leeville ranged from 4.5 to 11.5 percent.

Comments

1-5 Notwithstanding the uncertainties regarding the representativeness of the sampling conducted, one-third of the waste rock samples which were composited and for which acid-base accounting was conducted indicate an acid neutralizing potential to acid generating potential (NPR) of less than 3:1 and low net neutralizing potentials. Another 17 percent of the samples composited indicate an NPR of 3.2:1. It does not appear, however, that any kinetic testing was performed to further characterize the potentially acid generating (PAG) waste rock and provide a more detailed assessment of the availability of neutralizing waste rock to sufficiently encapsulate and buffer the PAG rock. The FEIS should address these issues and provide a more detailed description of site geochemistry.

1-6 Based on their net neutralizing potential and NPR values, West Leeville composited samples WLW1 and WLW2 appear to be labeled inconsistently between Tables 3-5 and 4-3 in the DEIS. This should be rectified for clarification in the FEIS.

The DEIS describes, on page 2-20, the waste rock facility, which would include a base of low permeability materials, fluid collection points, and cover material. However, the proposed design appears no different than that of waste rock piles at other mines which currently generate acidic drainage. The following waste rock facility design issues should be addressed in the FEIS in order to prevent acid mine drainage at the site.

1-7 Encapsulation: Specifically, how PAG waste rock would be encapsulated is unclear. The proposed end dumping method to encapsulate PAG rock would not effectively isolate the material and provide adequate neutralization capacity. Encapsulation at other mines in Nevada sometimes involves ten or twenty feet of acid neutralizing materials on all sides of the PAG rock, creating alkalinity which neutralizes the acidity. The Leeville DEIS proposes only a two-foot thick cap over the PAG rock, and there is no specification of base or lateral thickness of neutralizing material around the PAG rock. A proper encapsulation method must be used at the site. The FEIS should include the specifications that the acid neutralizing rock would need to meet in order to adequately encapsulate PAG rock in the waster rock facility.

Responses

Response 1-5

As described in Response 1-4, BLM believes that adequate representative sampling was conducted.

Materials with a Neutralization Potential Ratio (NPR) below the regulatory criterion of 3:1 represent 11.4 percent of the overall waste rock tonnage to be mined at the Leeville Project. Additional material identified by the reviewer, with an NPR of 3.2:1, represents an additional 3 percent of the total tonnage. Formations that are comprised of carbonate rock are identified in revised **Table 4-3** in the **Errata** section of Chapter 3 of the FEIS.

BLM recognized the potential metal release and acid generation potential of a portion of the waste rock to be mined at the Leeville Project. Newmont submitted the 1995 *Refractory Ore Stockpile and Waste Rock Dump Design, Construction, and Monitoring Guidelines* as part of its Plan of Operations. This document identified an engineering response to hydro-geochemically isolate material by placing it on a constructed pad with an appropriate capping system. Newmont will work with NDEP to finalize the construction plan. This engineering practice involves use of acid neutralizing rock with a Net Neutralization Potential (NNP) greater than 40 tons/kton $CaCO_3$ to reduce sulfide oxidation rates, and in combination with infiltration control, minimize formation of any acidic drainage. The reviewer is referred to responses for comments 1-7 through 1-11 below for specifics on encapsulation. Reference to revised Table 4-3 (see **Errata**) shows that over 88.6 percent of the waste rock to be mined at the Leeville Project has a NNP greater than 40 tons/kton $CaCO_3$.

Response 1-6

Table 3-5 has been revised. See **Errata**.

Response 1-7

Newmont's 1995 plan for managing PAG rock was approved by the Nevada Division of Environmental Protection (NDEP) for earlier projects; however, an updated version is being developed for Leeville. As described in Chapter 4 Geology and Minerals of the Draft EIS, approximately 11.4 percent of the rock to be produced in the Leeville Project would be PAG.

PAG material within the waste dump would be encapsulated with waste rock that has an ANP:AGP ratio of at least 3:1. The thickness of the encapsulating layers would be, at a minimum, 10 feet. A low permeability cap would be constructed on top of the encapsulation layer over the final lift of the PAG cell. In addition to any design specifications and closure requirements that NDEP may impose (such as the low permeability cap), Newmont would ensure the waste rock disposal facility is capped with a minimum 24 inches of growth medium and sloped to promote run-off of water (free-draining), prevent ponding or impounding of water, and prevent erosion.

Comments

1-8 Base materials: The low permeability base materials are identified in the DEIS as waste rock and subsoil, which are not appropriate for "low permeable materials." According to the DEIS, segregation of PAG rock and acid neutralizing rock is usually not possible, and there is no specification that the base would be neutral or acid neutralizing. "Random wheel compaction" is also not an appropriate method to assure low permeability of base material. The FEIS should specify the geochemical characteristics that would be required for the base rock, as well as a homogeneous and reliable compaction method and minimum numeric permeability rates for all low permeability barriers.

1-9 Fluid collection system: The fluid collection point at the low point of the waste rock pile is proposed to be unlined; therefore, leachate could infiltrate into and contaminate the groundwater when it recovers. There is no provision for transporting or treating the acidic water that will collect after mine closure. BLM should ensure that this would be adequately covered by the closure/reclamation bond. The FEIS should address this.

1-10 Final cover: We also recommend a final cover slope of 2 -3 percent in order to prevent the pools and puddles that can form as a result of the variability in a one percent slope.

1-11 According to the DEIS (p.4-16), groundwater quality within and surrounding backfilled mine shafts could be adversely affected by some constituents (e.g., nitrate and some metals) leaching from the backfill as the water table rises during recovery of the cone of depression. We recommend that the FEIS evaluate, and the BLM consider, neutralizing the shaft backfill material with cement in order to mitigate these potential impacts.

1-12 The DEIS (p. 2-19) states that pumped groundwater would be treated using chemical precipitation to reduce arsenic concentrations and any other parameters to meet state standards prior to conveyance in the discharge pipeline system. Newmont proposes to dispose of the sludge from this process in the Mill 4 Tailing Disposal Facility in the North Operations Area. The proposed water treatment process is not uniquely associated with mining and; therefore sludge from this process is not exempt from the Resource Conservation and Recovery Act (RCRA) Subtitle C regulation by virtue of the Bevill Amendment (40 CFR Section 261.4(b)(7)). Newmont must make a waste determination per the requirements of 40 CFR 262.11 to determine if the sludge is a hazardous waste subject to RCRA Subtitle C regulations before it can be disposed of on the Mill 4 Tailing Disposal Facility. It appears that at a minimum, the sludge may potentially be characteristic for toxicity for arsenic or possibly cadmium. EPA's toxicity criteria is based upon the Toxic Characteristic Leaching Procedure (TCLP) as described in 40 CFR 261.24. If representative samples of the sludge do not pass the TCLP test, Newmont will need to dispose of the sludge at a facility permitted to receive hazardous waste.

Responses

Response 1-8

Under NDEP standards, the waste rock disposal facility is not permitted to adversely impact water of the State. To ensure the facility does not adversely impact water of the State, the base would be constructed to a thickness of 1 foot and will have a hydraulic conductivity of 1×10^{-5} cm/sec. The source of the base material may be waste rock, existing subsoil, or nearby borrowed subsoil. The base material would be neutral or acid neutralizing.

Response 1-9

The base would be sloped to provide drainage. Precipitation falling within the base perimeter would report to the lowest elevation area on the low permeability base. Solution would then be captured in a collection pond(s) for sampling and sediment control. The collection pond(s) would be a lined facility suitable for containing leachate from infiltration of meteoric water. Acid water is not expected from this facility, as 88.6 percent of waste rock generated by the Leeville Project would be non-PAG.

Response 1-10

See Response 1-7.

Response 1-11

Use of cement or other carbonate material is expected to have little beneficial effect on water quality in backfilled shafts because the lithology of the lower plate rocks in the Leeville Project development are dominated by carbonaceous units of the Rodeo Creek, Popovich, and Roberts Mountains formations.

Response 1-12

Newmont would analyze sludge associated with the water treatment plant to determine whether the sludge would exhibit toxic characteristics. Should the sludge exhibit toxic characteristics; Newmont would dispose of the sludge in accordance with applicable regulations.

Comments

1-13 In the interest of disclosing the feasibility of project commitments and mitigation measures, we recommend that the FEIS include a discussion of the proposed reclamation bond amounts for each project phase. The FEIS should also discuss provisions that would be made for post-
1-14 operation surveillance to ensure that neutralization and/or stabilization of mining waste has been effective; and describe the mitigation actions that would be taken should destabilization or contamination be detected and identify who would be responsible for these actions. The FEIS should discuss whether funds could be needed for such post-closure activities, including mitigating impacts to streams and springs affected by groundwater drawdown and recovery. If such funds may be needed, we recommend that BLM require financial assurance at the beginning of the project and keep the fund current as conditions change in the affected area.

Water Quality

1-15 According to the DEIS (p. 4-23) concentrations of arsenic or other constituents in Rodeo, Boulder, and Sheep creeks are not expected to increase as a result of the proposed project because best management practices would be implemented. Elsewhere, however, the DEIS (p. 2-25) indicates that stormwater run-on and runoff diversions would only be designed to accommodate the 2-year, 6-hour precipitation event. Such a design is not consistent with standard industry practice. A 100-year, 24-hour or similar diversion ditch would be more appropriate at this facility. Furthermore, sedimentation facilities should be constructed to hold at least the 10-year, 24-hour storm.

1-16 Ore haul roads are known to cause stormwater runoff contamination. Best management practices must also be used to stop or control runoff from these areas so surface water standards are maintained.

1-17 All collection points for waste rock and refractory ore runoff at the Leeville Mine site must be constructed to contain all fluids.

1-18 The DEIS implies the high arsenic and other metals in surface runoff is naturally occurring in the upper area of Rodeo Creek without taking into account existing mining impacts. The FEIS should discuss the effects of exploration activities on the upper Rodeo valley surface water quality in light of the adverse analytical surface water sampling for arsenic, iron and manganese. In addition, the stormwater permit should address all pre-mining construction activities.

Responses

Response 1-13

Newmont has determined the cost of completing reclamation activities described under the Proposed Action including the agency-preferred alternatives to be $2.9 million. Newmont has submitted the detailed reclamation cost estimate to BLM and NDEP for agency review. Agency review will be completed and the bond amount as determined by BLM and NDEP will be included in the Record of Decision. In addition to the reclamation bond amount, a financial instrument is being developed to address long-term groundwater and waste rock disposal site monitoring at the Leeville Project. Refer to the Leeville Project Mitigation Plan contained in **Appendix A.** See Chapter 3 **Errata.**

Response 1-14

See Response 1-13.

Response 1-15

Stormwater run-on and run-off diversions would be constructed for a 25-year, 24-hour storm event. Sediment control would use Best Management Practices (BMPs) as approved by NDEP. See Chapter 3 **Errata.**

Response 1-16

Comment noted.

Response 1-17

Comment noted. Collection of run-off is part of the Proposed Action and Alternatives for the Leeville Project.

Response 1-18

Newmont, as a matter of course in geologic evaluations of prospective mineralization, collects rock samples from outcrops and road cuts, and has them analyzed for trace elements. In the Leeville Project area, 2,219 rock samples were analyzed for arsenic. The minimum, maximum, and mean arsenic concentrations measured in these samples were 12 parts per million (ppm), 10,000 ppm, and 375 ppm. Sixty-nine rock samples analyzed for iron had minimum, maximum, and mean concentrations of 5,500 ppm, 130,500 ppm, and 39,167 ppm. Sixty-nine samples were also analyzed for manganese, with resulting minimum, maximum, and mean concentrations of 15 ppm, 10,000 ppm, and 463 ppm.

Rodeo Creek is actively eroding rocks in the drainage basin that contain the above-mentioned concentrations of arsenic, iron, and manganese. All of these elements are mobile in the natural environment, and it is reasonable to detect them in water samples from Rodeo Creek. Minor surface disturbance associated with exploration drill roads in the Rodeo Creek drainage would not be expected to change this natural process.

NDEP does not make a distinction between construction activity and production level activity at mine sites. Newmont's North Area Stormwater permit issued by NDEP addresses all site activity irregardless of whether it is classified as construction or production.

Air Quality

	Comments	Responses
1-19	The DEIS does not provide projections of criteria pollutants that would result from the proposed project either as direct impacts, or as indirect or cumulative impacts. The FEIS should discuss impacts to the National Ambient Air Quality Standards (NAAQS) from estimated emissions of the project and alternatives, considering the cumulative effects from all aspects of mine excavation, construction, operation, and support activities, such as vehicle traffic. This should also be presented in the context of cumulative impacts from all of the projects in the vicinity of the Leeville project. Figure 1-1 of the DEIS depicts the general vicinity of the proposed Leeville mine. The FEIS should assess the cumulative impacts to air quality from the proposed project and other projects in the "North Operations Area," where the Leeville mine is located, and the "South Operations Area," where the Leeville ore would be processed. Monitoring data exist for mines in these areas. For example, the Supplemental DEIS for the Betze Project (September 2000) and the DEIS for the Newmont South Operations Area Plan Amendment ("SOAPA," September 2000) both provide monitoring data.	**Response 1-19** Newmont will apply for any air permits necessary for the Leeville Project through the Bureau of Air Quality at NDEP. Processing of ore mined at Leeville will not result in changes in currently permitted emission limits at the processing facilities. The Draft EIS adequately analyzed potential air quality impacts from the Leeville Project.
1-20	The DEIS (p. 4-4) states that processing of Leeville ore at the South Operations Area would offset production from existing sources with no projected increases in total annual mercury emissions. However, the SOAPA DEIS (p. 2-8) indicates that Mill 5 throughput capacity will remain unchanged at 20,000 tons/day, and Mill 6 may be increased from 8,000 tons/day to 8,500 tons/day. It is unclear whether the additional Leeville ore processing was included in the SOAPA mill throughput estimates for the SOAPA DEIS. This should be clarified in the FEIS. If the current SOAPA mill throughput estimates do not reflect the addition of Leeville ore, the FEIS should describe the additional emissions of criteria and hazardous air pollutants that would result from processing of Leeville ore.	**Response 1-20** Air quality operating permit No. AP1041-0404, issued by NDEP Bureau of Air Quality, restricts through-put at the ROTP/Mill 6 process facility to 560 tons/hour, or 13,440 tons/day. The increased production rate from the proposed South Operations Area Project Amendment (SOAPA) of 8,000 to 8,500 tons/day was approved by the Bureau of Air Quality on August 29, 1996. Ore from the Leeville Project would displace ore from other sources and would not change the process rate or permitted emission limits.
1-21	EPA has reviewed the BLM's "*Cumulative Impacts Analysis of Dewatering and Water Management Operations for the Betze Project, South Operations Area Project Amendment, and Leeville Project*" (April, 2000). We have previously commended BLM for its decision to prepare this analysis, as these mines have and will continue to have an enormous impact on the hydrology, hydrogeology, and water quality, as well as vegetation and wildlife, of some areas of the Humboldt River basin. EPA is very concerned that safe yield will be exceeded by dewatering activities in the impact area. About 30 percent of the groundwater pumped will be removed from the hydrologic system, and it is stated that the regional water balance will be out of equilibrium. It is unclear that the resulting ecological disruption will be appropriately mitigated. Furthermore, the analysis lacks some important information, which we have addressed in our comment letters on the SOAPA DEIS and the Betze Project Supplemental DEIS. The Final Environmental Impact Statements for these projects have not yet been filed, and we have not had a chance to review any follow-up or supplemental analysis. We, therefore, wish to reiterate our comments on the "*Cumulative Impacts Analysis of Dewatering and Water Management Operations for the Betze Project, South Operations Area Project Amendment, and Leeville Project,*" which were included in those letters. These issues should also be addressed comprehensively within each of the individual EISs for the cumulative impact area.	**Response 1-21** Comment noted. A determination as to "safe yield" for hydrologic basins potentially affected by dewatering activities is made by the State Engineer through the groundwater appropriation process. Cumulative effects of the Leeville Project dewatering program are described in the Cumulative Effects section of Water Quantity and Quality Chapter 4 of the Draft EIS and in the Cumulative Impact Analysis (CIA) report (BLM 2000a).

Letter 2

Humboldt River Basin Water Authority
c/o P.O. Box 2008
Carson City, Nevada 89703

Elko County
Eureka County
Humboldt County
Lander County
Pershing County

April 26, 2002

Ms. Deb McFarlane
Leeville EIS Project Manager
Bureau of Land Management
Elko Field Office
3900 East Idaho Street
Elko, Nevada 89801

RE: Comments on Leeville Project DEIS

Dear Ms. McFarlane:

2-1 On behalf of the Humboldt River Basin Water Authority (HRBWA), I am pleased to submit the following comments to the Leeville Project DEIS. At the outset, let me note that HRBWA supports responsible mining on public lands within the Humboldt Basin. Mining is a critical element to the region's natural resource dependent economy. The Authority encourages the Bureau of Land Management (BLM) to facilitate mining operations which effectively mitigate project impacts and provide significant contributions to the regional economy.

2-2 With regard to the Leeville Project, HRBWA believes that Newmont's Proposed Action effectively seeks to limit discharges of mine-dewatered water to the Humboldt River. HRBWA has worked aggressively with the Nevada State Engineer and the Nevada State Legislature to ensure that mine-related discharges to the Humboldt River are minimized, if not eliminated. Further, HRBWA is committed to protection of existing decreed and certificated water rights within the Humboldt River Basin. As the comments which follow suggest, the Authority believes that the Final EIS must address methods to mitigate potential Leeville Project related impacts to existing stockwater wells as well as surface water losses attributable to long-term reductions in base flow. NEPA requires that the EIS describe all relevant, reasonable mitigation measures and with regard to impacts to water resources, the Leeville Project EIS simply provides an insufficient treatment of mitigation.

__Specific Comments__

2-3 **Page 4-16, 1st full paragraph:** The summary text here and in the 9th paragraph presents uncertainty regarding the ability of existing water management systems to accommodate Leeville dewatered water. The FEIS must present a more conclusive analysis of the extent to which Leeville mine dewatered water will be managed through existing water management systems (ie. irrigation, infiltration, injection). A quantitative estimate of water which may require discharge to the Humboldt River is needed. Only in this way can potential adverse and beneficial impacts of possible discharge to the Humboldt River be understood.

Responses

Response 2-1

Comment noted.

Response 2-2

Comment noted. As discussed in the Draft EIS, the Leeville Project is not anticipated to create any significant incremental impacts to water resources beyond those related to other mining projects in the Carlin Trend. The BLM has developed comprehensive mitigation plans to address those impacts (BLM 1993b) (BLM 2002). The Draft EIS did evaluate additional possible mitigation measures for potential impacts to water resources related to the Leeville Project (pages 4-31 & 4-32 in Draft EIS). Based on public comments on the mitigation proposed in the Draft EIS, the BLM has developed a comprehensive Mitigation Plan for the Leeville Project, which is attached as **Appendix A** to this Final EIS.

Response 2-3

It is very unlikely that discharge to the Humboldt River would become necessary as a result of water management activities associated with the Leeville Project. Peak dewatering rates (25,000 gallons per minute (gpm)) are predicted to occur in the first 2 years of operation, and then will decline to less than 10,000 gpm later in the project (Figure 3-7 in Draft EIS). Past operational experience has shown that the water management system in Boulder Valley (irrigation, injection, and infiltration) can sustain dewatering rates in excess of 40,000 gpm. Projected dewatering rates for the Barrick operations (Post/Betze and Meikle mines), minus consumptive use, when combined with projected Leeville dewatering rates, are within the existing capacity of the Boulder Valley water management system. The option to request from the State Engineer to discharge excess water to the Humboldt River is retained to allow for unforeseen circumstances. Under the circumstance that discharge to the Boulder Valley system exceeds it's capacity, and discharge to the river is required, potential effects of such discharge have been analyzed in the Cumulative Impact Analysis (CIA) report (BLM 2000a).

Comments

2-4 **Page 4-17, 7th paragraph:** The Barrick NPDES is described here but no indication is given as to whether Newmont has, or is required to obtain a similar discharge permit. The FEIS must describe Newmont's requirements for a NPDES permit or, if Newmont intends to utilize the Barrick discharge system, whether the existing Barrick NPDES permit allows Leeville's use of the permit capacity. If an agreement between Barrick and Newmont exists which enables shared use of the NPDES permit and related discharge system, said agreement should be described and referenced in the FEIS.

2-5 This section also suggests that State Engineer approval may be requested to discharge mine dewatered water into the Humboldt River. Ruling 5011 by the State Engineer is referenced in the DEIS. Said ruling should be described in more detail in the FEIS. In addition, the FEIS must address how Leeville dewatered water will be managed in the event the State Engineer does not provide Newmont authorization to discharge to the Humboldt River.

2-6 **Page 4-17, 9th paragraph:** Here the text states the Leeville Project discharge to the Humboldt River would occur during the time when flow is generally low. The FEIS should consider whether such additional flows will impair irrigation diversion structure maintenance along the river which typically occurs during periods of low flow.

2-7 **Page 4-18, 1st paragraph:** Because the reviewer's analysis of impacts in the Leeville DEIS is incomplete without also looking at the Cumulative Impact Report and the Betze Draft Supplemental EIS, these documents should have been distributed with and made subject to review and comment as a part of the Leeville Project DEIS. In lieu of such inclusion and further review of these documents, pertinent sections from each should be more completely summarized in the FEIS.

2-8 **Page 4-18, 4th paragraph:** The document here suggests that recovery to within 90% of premining water table would take up to 20 more years due to the Leeville Project. The FEIS should indicate what the total recovery period would be with the Leeville Project. It is noted that the suggestion of "more than 100 years" is not conclusive enough to enable evaluation of consequences (ie. reductions in base flow over an uncertain number of years). Does more than 100 years mean 120 years, 200 years or ?

2-9 **Page 4-25, 1st paragraph:** If natural seasonal and annual fluctuations in groundwater elevation are on the order of 10 feet and the Leeville Project will further reduce elevations by 10 feet, did the analysis of impacts from the project on springs, seeps, streams, and vegetation consider a total groundwater elevation change of 20 feet? If so, this fact should be noted in the FEIS. If not, the FEIS should present impacts resulting from a 20' decline in groundwater elevations.

Responses

Response 2-4

Permit NV0022675, issued by NDEP to Barrick Goldstrike Mines Inc., allows for discharge of water from the Boulder Valley water management facility to the Humboldt River via man-made pipelines and canals, Boulder Creek, Whitehouse Ditch, or Rock Creek. Within Part 1.A. of this permit, Item 14 states, "The Permittee must notify the Division if it intends to accept water from other mining companies within the Little Boulder Basin area. This notification must be provided prior to water acceptance." As anticipated in this permit, Newmont would not be required to obtain a permit for discharge of Leeville dewatering water should it become necessary.

Response 2-5

Appendix B to this Final EIS contains the full-text Ruling #5011 from the Nevada State Engineer. Newmont would maintain compliance with all terms of this ruling. If discharge is requested and denied by the State Engineer, Newmont would be forced to reduce its pumping rate to manage the excess water in Boulder Valley.

Response 2-6

If discharge to the Humboldt River is necessary and authorized by the State Engineer, increased flow to the Humboldt River during periods of low flow could affect maintenance opportunities for irrigation systems.

Response 2-7

Copies of the CIA (BLM 2000a) and the Betze Supplemental Draft EIS (BLM 2000b) are available from the Elko Field Office of the BLM.

Response 2-8

Recovery of groundwater to pre-mining levels will not occur evenly throughout the cumulative area of drawdown. For example, cumulative recovery near Gold Quarry adjacent to Maggie Creek, 90 percent recovery is predicted to occur in 2031. In contrast, near the Leeville Project area in the Carlin Formation in Little Boulder Valley, 90 percent recovery due to cumulative dewatering is expected in year 2400. At Leeville, 90 percent recovery is expected in year 2185 for the lower plate hydrostratigraphic unit. Upper plate rocks would be dewatered for Leeville only during about the first 4 years, at up to 1,000 gallons per minute, until the shaft is advanced into lower plate rocks. As stated in the Leeville Draft EIS, the Leeville project would add up to about 20 years to groundwater recovery in the Project area, which would be added to the cumulative recovery for all mine dewatering in the Carlin Trend. This information, as well as potential duration of reductions in surface flow, are discussed in the *Water Quantity and Quality* section in Chapter 4 of the Draft EIS (pages 4-15 through 4-33). See also **Errata** for page 4-16 in Chapter 3 of this Final EIS.

Response 2-9

The EIS analysis includes potential impacts to groundwater levels that exceed 10 feet because natural seasonal and annual fluctuations in groundwater elevations are on the order of 10 feet. This natural fluctuation is not added to the drawdown analysis caused by mine dewatering because it is considered the background or baseline condition.

Comments

2-10 **Page 4-26, 10th paragraph:** This section notes the Leeville Project could cause additional water table lowering in three stock-watering wells. The DEIS does not indicate whether such lowering would render said wells inoperable or inefficient. The FEIS should address operational impacts to these stockwater wells. The section on Mitigation on Page 4-31 should provide methods to mitigate impacts to stockwater wells.

2-11 **Page 4-30, 8th-10th paragraphs:** An estimate of the total loss in base flow to the Humboldt River system (ie. 0.1cfs X 100 plus years of reduced flow) resulting from the Leeville Project should be made and presented in total acre feet in the FEIS. 2-12 This total represents the direct impact to downstream water rights holders and would serve as the benchmark against feasibility of various mitigation measures might be considered.

2-13 **Page 4-31, Potential Mitigation:** This section does not describe any methods to mitigate impacts to existing water rights holders (stockwater wells and stream and river base flow losses). The FEIS should describe feasible methods to mitigate impacts to water rights holders. All relevant, reasonable mitigation measures must be identified in the FEIS. The probability of the mitigation measure being implemented must be discussed.

2-14 It is important to note that monitoring is not considered one of five methods recognized by the Council On Environmental Quality to mitigate impacts. Those five acceptable methods include avoiding, minimizing, rectifying, reducing and compensating (40CFR1508.20). The FEIS must present methods to mitigate Leeville Project impacts to owners of existing surface and groundwater rights.

I trust these comments will serve to improve the Leeville Project as such may ultimately be approved by the BLM for development and operation.

Sincerely,
Paul Miller
Paul Miller
Chairman

cc: Board Members and Alternates, HRBWA
Mr. Paul Pettit, Newmont Gold

Responses

Response 2-10

Potential operational impacts to the three stock watering wells would depend on the magnitude of groundwater drawdown that would occur. Table 4-6 in the Draft EIS indicates that the amount of added drawdown in the wells could range from 10 to 100 feet. Because these water sources have certificated water rights, the State Engineer would require the cause of adverse impacts to correct the problem or provide a sufficient replacement water source.

Response 2-11

Assuming that flow reductions to the Humboldt River caused by the Leeville Project average 0.1 cubic feet per second (cfs), total volume would be approximately 24 million gallons per year, or 3.3 billion gallons for 100 years. As stated on page 4-30 of the Draft EIS, however, the maximum flow reduction of 0.1 cfs is predicted to occur approximately 10 years after cessation of dewatering, after which base flow conditions would begin to approach pre-mine flows. As such, the volume estimate provided above would be higher that predicted.

Response 2-12

Mean annual flow in the Humboldt River near the project area is about 400 cfs (see Table 3-12 in Draft EIS). The maximum flow reduction in the river predicted to occur from Leeville dewatering would be about 0.1 cfs, or 0.025 percent of the mean annual flow.

Mitigation for predicted reductions in baseflow in the Humboldt River are described in Newmont's Mitigation Plan for the South Operations Area Project (BLM 1993b) and the amended Mitigation Plan for the South Operations Area Project Amendment (BLM 2002). In part, this plan states "Newmont will mitigate potential impacts to irrigation-season flows and water rights holders on the upper and lower Humboldt River by foregoing the use of certain senior irrigation rights controlled by Newmont of the TS Ranch." The decreed rights to be used and the mechanisms for calculating the loss of irrigation-season flow to be mitigated are described within the 1993 Mitigation Plan.

Response 2-13

Refer to Newmont's South Operations Area Project Mitigation Plan (BLM 1993b) regarding potential impacts to water rights and the amended Mitigation Plan for the South Operations Area Project Amendment (BLM 2002). Also see the Leeville Project Mitigation Plan attached to this Final EIS (**Appendix A**).

Response 2-14

The reviewer is referred to 40 CFR 1505.2(c). Monitoring and enforcement are required for any mitigation as needed. Also see Response 2-12.

Letter 3

Responses

KENNY C. GUINN
Governor

STATE OF NEVADA

JOHN P. COMEAUX
Director

DEPARTMENT OF ADMINISTRATION
209 E. Musser Street, Room 200
Carson City, Nevada 89701-4298
Fax (775) 684-0260
(775) 684-0209

April 25, 2002

Ms. Deb McFarlane, Leeville Project Coordinator
Bureau of Land Management
Elko Field Office
3900 Idaho St.
Elko, NV 89801

Re: SAI NV # E2002-121

Project: DEIS for Newmont Mining Corporation's Leeville Project

Dear Ms. McFarlane:

Enclosed are the comments from the Nevada Divisions of Water Resources, Wildlife, and Minerals, the Bureau of Mines at UNR, and the State Office of Historic Preservation concerning the above referenced report. These comments constitute the State Clearinghouse review of this proposal as per Executive Order 12372. Please address these comments or concerns in your final decision. If you have questions, please contact me at 684-0209.

Sincerely,

Heather K. Elliott

Heather K. Elliott
Nevada State Clearinghouse/SPOC

Comments

Responses

NEVADA STATE CLEARINGHOUSE

Department of Administration
Budget and Planning Division
209 East Musser Street., Room 200
Carson City, Nevada 89701-4298
(775) 684-0209
Fax (775) 684-0260

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DATE: March 5, 2002

- Governor's Office
  - Agency for Nuclear Projects
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- Economic Development
- Tourism
- Fire Marshal
- Human Resources
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- Nevada League of Cities
- Conservation-Natural Resources
- Director's Office
- State Lands
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- Wildlife
  - Region 1
  - Region 2
  - Region 3
- Conservation Districts
- State Parks
- Water Resources
- Natural Heritage
- Wild Horse Commission

Nevada SAI # E2002-121
Project: DEIS for Newmont Mining Corp's Leeville Project
REF: E~~1998-019~~
1998-019

___Yes ___No Send more information on this project as it becomes available.

CLEARINGHOUSE NOTES:
Enclosed, for your review and comment, is a copy of the above mentioned project. Please evaluate it with respect to its effect on your plans and programs; the importance of its contribution to state and/or local areawide goals and objectives; and its accord with any applicable laws, orders or regulations with which you are familiar.

Please submit your comments no later than **April 22, 2002.** Use the space below for short comments. If significant comments are provided, please use agency letterhead and include the Nevada SAI number and comment due date for our reference. Questions? Heather Elliott, 684-0209.

THIS SECTION TO BE COMPLETED BY REVIEW AGENCY:

___No comment on this project
___Proposal supported as written
___Additional information below
___Conference desired (See below)
___Conditional support (See below)
___Disapproval (Explain below)

AGENCY COMMENTS:

3-1 The Division of Water Resources has reviewed the subject Draft EIS. Newmont Mining Corporation has permits granted by the State Engineer for appropriation of the underground waters of this State. Those permits have terms and conditions that include extensive modeling and monitoring requirements. The water right permits are granted for mining and milling as well as dewatering purposes. They are under Permits 63984 through 63989, inclusive. The use of a dam under Safety of Dams Permit J-320 is included in the water use and distribution system.

Signature s:\shrdat\clear\clear.doc

DWR Water Resources
Agency

4-19-02
Date

Response 3-1

Comment noted

Comments

KENNY C. GUINN
Governor

STATE OF NEVADA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
DIVISION OF WILDLIFE
1100 Valley Road
Reno, Nevada 89512
(775) 688-1500 • Fax (775) 688-1595

R. MICHAEL TURNIPSEED, P.E.
Director
Department of Conservation and Natural Resources

TERRY R. CRAWFORTH
Administrator

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[illegible] OFFICE

April 19, 2002

Heather Elliott
Nevada State Clearinghouse
Department of Administration
Budget and Planning Division
209 East Musser Street, Room 200
Carson City, NV 89701-4298

RE: SAI# E2002-121, Draft Environmental Impact Statement for the Leeville Project, Newmont Mining Corporation - BLM

Dear Ms. Elliott:

3-2 We appreciate the opportunity to review and provide comments on the subject document. On page S-2 the document discusses the design of the conveyance system for excess groundwater pumped by the mine dewatering system. This conveyance system includes an open canal that will bisect the low country just east of the TS reservoir. The Division of Wildlife is very concerned with this concept. We believe the open canal over one mile long will be a major disruption for the daily and seasonal movement of the local pronghorn antelope population. In addition, the canal design includes side slopes of 3: 1 and a geotextile membrane liner. We feel the current design will be problematic for all terrestrial wildlife that may encounter the conveyance system. We are very concerned with the possibility that wildlife will attempt to access the water in the canal and be swept into the canal and drown. We would strongly recommend against having an open canal. It would be our recommendation to continue the proposed pipeline to the discharge point at the reservoir. This would eliminate any possibility of any drowning incidents or access to untreated water by wildlife.

3-3 On page 2-19, in the fifth paragraph down, the document discusses the mine water sump that will be constructed to contain oil-contaminated water from the undergound workings. What methods will be incorporated into the design of these ponds to protect wildlife from coming into contact with the hydrocarbon contamination? 3-4 Depending on the concentration of hydrocarbon contamination, it may be necessary for Newmont to permit this pond under the Division's Industrial Artificial Pond Permit program.

3-5 On page 2-20, in the first paragraph, the document again discusses the design of the open water conveyance ditch. There is no discussion in this section on how Newmont proposes to protect wildlife from drowning in the ditch. We would suggest a discussion of wildlife protective measures be incorporated into the document if this ditch is constructed.

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(O) 5386

Responses

Response 3-2

BLM has selected Alternative A, which eliminated the open canal portion of the discharge water conveyance system.

Response 3-3

Newmont has 10 facilities located in the Carlin Trend that are similar to the mine water sump proposed for the Leeville Project. Since 1997, no wildlife mortalities associated with these facilities are known to have occurred that are directly attributable to either the hydrocarbons or the water present. These sumps typically have a small cement-lined settling basin that receives the mine water. Mine water, when flowing out of the settling basin, passes through skimmers and/or spill booms where hydrocarbons, if present, are removed. Water is then collected in a larger lined pond for disposal. Newmont will monitor the Leeville Mine water sump for any potential wildlife mortalities and, if this becomes a problem (which is not anticipated), appropriate action will be taken. See the Leeville Project Mitigation Plan in **Appendix A** of the Final EIS.

Response 3-4

Comment noted.

Response 3-5

See Response 3-2.

	Comments	Responses
3-6	On page 2-35, under the heading Underground Mine Shafts, the last paragraph states that berms will be constructed around the rock faces. How many acres of rock faces will remain following the closure of the Leeville Mine? This acreage will be a residual impact and it is not quantified in the document.	**Response 3-6** Approximately 0.5 acre would remain as rock faces at the Leeville Project site.
3-7	On the same page under the heading Waste Rock Disposal Facility, the second paragraph states growth medium will be redistributed to an average depth of 24 inches. We consider this to be an excellent design feature. This amount of growth medium will greatly increase the potential for the site to support a post mine vegetative community suitable for wildlife.	**Response 3-7** Comment noted.
3-8	On page 2-45, under the heading of Mitigation and Monitoring Measures, the last bullet indicates revegetated areas would remain fenced to protect the vegetation from livestock grazing. How long would grazing be restricted from the revegetated disturbances? This information should be included in this section.	**Response 3-8** The second to last bullet in the Mitigation and Monitoring section of the Draft EIS indicates that vegetation would be evaluated through three growing seasons following reclamation. Fencing would remain for at least three growing seasons or until vegetation meets criteria outlined in Instruction Memorandum No. NV-99-013.
3-9	On page 3-41, under the heading of Springs and Seeps, in the second paragraph the last sentence indicates 75 springs and seeps have been inventoried along this portion of the Tuscaloosa Range. We believe the Tuscaloosa Range is in Alabama. We also believe the document is referring to the Tuscarora Range.	**Response 3-9** The reviewer is correct. Tuscarora is the correct mountain range name. See Chapter 3 **Errata** in the Final EIS for page 3-41 correction.
3-10	On page 4-2, under the heading Mining Activities, in the fifth paragraph the document indicates the current dewatering rate for the Goldstrike property is 40,000 gpm. This is not consistent with what was presented in Figure 3.7 on page 3-25. The figure indicates the dewatering rate at Goldstrike is about 25,000 gpm. Which figure is correct?	**Response 3-10** The correct volume is 25,000 gpm. See Chapter 3 **Errata** in the Final EIS for page 4-2 correction.
3-11	On page 4-6, in Table 4.2, Dee Gold is identified as an active gold mine. This is not an accurate statement. Dee Gold is in final closure and has been since January of 2002.	**Response 3-11** Dee Gold operations are currently in a reclamation phase and BLM does not consider the site inactive until reclamation is complete.
3-12	On page 4-34, in the sixth paragraph, the document states "For post-mining site conditions, a minimum of 12 inches of soil would be replaced during reclamation." This contradicts what was presented on page 2-35 where the document indicated 24 inches of growth medium would be placed on surfaces to be reclaimed.	**Response 3-12** Growth medium replacement depth would be 12 inches for all disturbance areas with the exception of rock faces and the waste rock disposal facility. The waste rock disposal facility would receive 24 inches of growth medium.
3-13	On page 4-36, under the heading Direct and Indirect Impacts, in the first paragraph the document indicates 486 acres of vegetation would be removed. The next sentence indicates reclamation would reestablish on these sites. Does this indicate all of the mine related disturbances would be revegetated? What of the rock faces discussed above? Will the rock faces be revegetated? If they will not be revegetated, how many acres of disturbance will not be revegetated?	**Response 3-13** See Response 3-6.
3-14	On page 4-43, under the heading of Direct and Indirect Impacts in the sixth paragraph the document indicates the effects of the proposed mine water sump on migratory shorebirds and waterfowl would be minimal. We do not agree with this statement. Ponds much smaller than one acre in size have been shown to be very attractive to many migratory bird species including shorebirds and waterfowl. If this pond contains hydrocarbons at problematic levels, this pond could have a significant impact to birds species, including shorebirds and waterfowl.	**Response 3-14** See Response 3-3.

	Comments	Responses
3-15	On page 4-44, under the heading of Alternative A, the document discusses the impact of this alternative on wildlife resources. This is the best alternative for wildlife. Eliminating the mile of open ditch will vastly reduce the potential for drowning. The construction of the pipeline would eliminate the barrier to north-south movement by the antelope resource in the area as well. Both of these issues are considered significant to the Division. On page 4-45, under the heading of Potential Mitigation and Monitoring, in the second paragraph the document indicates the open canal would cause the drowning of small mammals and reptiles. Our agency considers this canal to be a drowning threat to many more species than just small mammals and reptiles. Plastic lined ponds similar in design to the canal have proven to be lethal to wildlife as large as mature deer. The plastic material is extremely slippery and mortalities have occurred in ponds with no solution in them because the deer could not escape up plastic slopes as short at two feet. The addition of water vastly increases the lack of traction for terrestrial wildlife.	**Response 3-15** See Response 3-2.
3-16	On the same page, under the heading of Irreversible and Irretrievable Commitment of Resources, the document indicates a portion of the rock faces would not be reclaimed. This impact is not quantified any where in this document. This should be clarified.	**Response 3-16** See Response 3-6.
3-17	On page 4-47, under the heading of Sensitive Bat Species, the document indicates the only impact to bat species would be the loss of upland foraging habitat. Any changes to surface water resources from the proposed action could also impact bat resources. Bats are very dependent on open water for their survival. Any losses of surface waters would impact the bats dependent on that water. If there are any questions or comments regarding this input, please contact me.	**Response 3-17** Dewatering activities at the Leeville Project are not expected to have any incremental effect to surface water that would adversely affect bats.

Sincerely,

Rory E. Lamp

Rory E. Lamp
Biologist III
1375 Mountain City Highway
Elko, NV 89801
(775) 738-5332

RL/rl
cc: Habitat Bureau
Elko Field Office, NDOW
File

Comments

KENNY C. GUINN
Governor

STATE OF NEVADA
COMMISSION ON MINERAL RESOURCES
DIVISION OF MINERALS
400 W. King Street, Suite 106
Carson City, Nevada 89703
(775) 684-7040 • Fax (775) 684-7052
http://minerals.state.nv.us/

Las Vegas Branch:
1771 E. Flamingo Rd.
Suite 120-A
Las Vegas, Nevada 89119
(702) 486-4343
Fax (702) 486-4345

ALAN R. COYNER
Administrator

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March 28, 2002

Heather Elliott
Nevada State Clearinghouse
Department of Administration
Budget and Planing Division
209 East Musser Street, Room 200
Carson City, NV 89701-4298

Re: DEIS for Newmont Mining Corp's Leeville Project, Nevada SAI# E2002-121

Dear Heather,

3-18 The Nevada Division of Minerals offers strong support for Newmont Mining Corp's Leeville Project which will provide production and employment well into the future.

3-19 If backfilling the shafts is the method ultimately chosen to close them, it should be recognized that some consolidation of the backfill material is likely to occur. For shafts of this depth, some settlement of the backfill material should be expected. It would be good to monitor the backfill for a while, before applying topsoil and revegetating.

3-20 It should be noted that the mines of the Carlin Trend collectively are expected to have produced 50 million ounces of gold by approximately mid-April of this year. That is a tremendous achievement for the companies and employees involved. Development and production from the Leeville Project will enhance this amount.

Thank you for the opportunity to comment on this very worthwhile project.

Sincerely,

Doug Driesner

Doug Driesner
Director of Mining Services

Dennis Bryan; *Small-Scale Mining and Prospecting*
James Chavis; *Large-Scale Mining*
Patrick Fagan; *Geothermal Resources*

Commission on Mineral Resources
Fred D. Gibson, Jr., Chairman; *Large-Scale Mining*

Eugene Kozlowski; *Oil and Gas*
Jay Parmer; *General Public*
Ron Parratt, V. Chair.; *Exploration and Development*

Responses

Response 3-18

Comment noted.

Response 3-19

Comment noted.

Response 3-20

Comment noted.

Comments

Responses

NEVADA STATE CLEARINGHOUSE

Department of Administration
Budget and Planning Division
209 East Musser Street., Room 200
Carson City, Nevada 89701-4298
(775) 684-0209
Fax (775) 684-0260

DATE: **March 5, 2002**

Governor's Office
Agency for Nuclear Projects
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Fire Marshal
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Health Division
Indian Commission
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Legislative Counsel Bureau
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Transportation
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Historic Preservation
Emergency Management
Office of the Attorney General
Washington Office
Nevada Assoc. of Counties
Nevada League of Cities

Conservation-Natural Resources
Director's Office
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Environmental Protection
Forestry
Wildlife
Region 1
Region 2
Region 3
Conservation Districts
State Parks
Water Resources
Natural Heritage
Wild Horse Commission

Nevada SAI # **E2002-121**
Project: **DEIS for Newmont Mining Corp's Leeville Project**
REF: **E1008-019**

Yes X No Send more information on this project as it becomes available.

CLEARINGHOUSE NOTES:
Enclosed, for your review and comment, is a copy of the above mentioned project. Please evaluate it with respect to its effect on your plans and programs; the importance of its contribution to state and/or local areawide goals and objectives; and its accord with any applicable laws, orders or regulations with which you are familiar.

Please submit your comments no later than [redacted] the space below for short comments. If significant comments are provided, please use agency letterhead and include the Nevada SAI number and comment due date for our reference. Questions? Heather Elliott, 684-0209.

THIS SECTION TO BE COMPLETED BY REVIEW AGENCY:

3-21

___No comment on this project
X_Proposal supported as written
___Additional information below

___Conference desired (See below)
___Conditional support (See below)
___Disapproval (Explain below)

AGENCY COMMENTS:

J. V. Tingley
Signature s:\shardata\clear-clear.doc

NBMG/UNR
Agency

April 22, 2002
Date

Response 3-21

Comment noted.

NEVADA STATE CLEARINGHOUSE
Department of Administration
Budget and Planning Division
209 East Musser Street., Room 200
Carson City, Nevada 89701-4298
(775) 684-0209
Fax (775) 684-0260

DATE: March 5, 2002

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Historic Preservation
Emergency Management
Office of the Attorney General
Washington Office
Nevada Assoc. of Counties
Nevada League of Cities

Conservation-Natural Resources
Director's Office
State Lands
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Wildlife
  Region 1
  Region 2
  Region 3
Conservation Districts
State Parks
Water Resources
Natural Heritage
Wild Horse Commission

Nevada SAI # E2002-121
Project: DEIS for Newmont Mining Corp's Leeville Project
REF: E1008-019

✓ Yes __ No Send more information on this project as it becomes available.

CLEARINGHOUSE NOTES:
Enclosed, for your review and comment, is a copy of the above mentioned project. Please evaluate it with respect to its effect on your plans and programs; the importance of its contribution to state and/or local areawide goals and objectives; and its accord with any applicable laws, orders or regulations with which you are familiar.

Please submit your comments no later than **April 22, 2002.** Use the space below for short comments. If significant comments are provided, please use agency letterhead and include the Nevada SAI number and comment due date for our reference. Questions? Heather Elliott, 684-0209.

THIS SECTION TO BE COMPLETED BY REVIEW AGENCY:

___No comment on this project
___Proposal supported as written
_✓_Additional information below

___Conference desired (See below)
___Conditional support (See below)
___Disapproval (Explain below)

AGENCY COMMENTS:

3-22 The SHPO could find no record of ever receiving the Bureau of Land Management's determination of project effect for the subject undertaking. More specifically, the SHPO has no record of receiving the Bureau of Land Management's determination that the proposed project will not pose an adverse effect to the mining site of CrNV-01-10842 (page 4-64). If our records are in error, please send this office a copy of the pertinent correspondence to complete our file on this undertaking.

Rebecca L Palmer
Signature s:\shardat clear clear.doc

Historic Preservation
Agency

4/15/02
Date

Response 3-22

On May 1, 2002, the BLM submitted to the State Historic Preservation Office (SHPO) a letter to consult on potential effects to the Rock Creek TCP (CRNV-11-9931), Tosawihi Quarries TCP (CRNV-11-9932), and the old Lynn Creek placer mining operation (CRNV-01-10842) as a result of the proposed Leeville Project. The letter contains reasons for BLM determination that the Leeville Project would have no effect to the Rock Creek TCP, Tosawihi Quarries TCP, or the Lynn Creek placer site. On June 4, 2002, the BLM received a letter from SHPO that stated it concurs with BLM's determination that the proposed undertaking will not pose an effect to the following historic properties: Rock Creek TCP (CRNV-11-9931), Tosawihi Quarries TCP (CRNV-11-9932), and CRNV-01-10842.

Letter 4

Natives Impacted By Mining
P.O. Box 256
Nixon, NV 89424
775-574-0101
775-574-1025 FAX

May 29, 2002

Deb McFarlane
Leeville Project Manager
Bureau of Land Management
Elko Field Office
3900 Idaho Street
Elko, Nevada 89801

Dear Ms. McFarlane,

4-1 Natives Impacted by Mining respectfully requests the Elko Field Office of the BLM require the
Leeville Project implement Alternatives A, B, and C. The impacts of mining in the Carlin Area will
cause substantial damage to the cultural resources and this project will only add to these impacts.
4-2 Every effort must be made to minimize dewatering, as most of the impacts are the result of extensive
dewatering already taking place in the region. The BLM has a trust responsibility to the Western
Shoshone people to protect the cultural resources on public land and to ensure that the development
of mining properties does not destroy their quality of life. Although the impacts from this mining
project are minimal compared to other projects in the area, any additional impacts may cause
irreparable harm to Rock Creek and other cultural resources in the area.

4-3 The Alternatives A, B, and C will minimize the additive impacts of this project to the Carlin area.
Alternative A is necessary to prevent the exposure of wildlife to potentially harmful water. This will
also minimize the evaporation of water and maximize the amount available for infiltration.
Alternative B is necessary to minimize the amount of waste that is left on the surface expose to the
conditions promoting acid generation. It will also minimize the amount of water necessary to fill the
void after the mine is completed. Alternative C will minimize surface disturbance and this must be
done as the cumulative disturbance has already impacts on the environment. There also must be
4-4 grouting of all fractured surfaces within the underground workings to minimize the amount of water
that seeps through and needs to removed by the sump. This will help in the amount of water and
also be helpful in minimizing the conditions for acid generation. If the walls of the shafts are acid
4-5 generation this will cause metal migration in the sump waters and will have considerable metal
loading in the groundwater when the mining is complete. Even if acid generation does not occur,
neutral waters will still create a severe migration of the Arsenic and Selenium found in the MWMP
tests.

4-6 Natives Impacted by Mining strongly support the Te-Moak Tribe and Bands. The BLM has a trust responsibility to preserve and protect the cultural resources of these federally recognized tribes and their ancestral lands.

Sincerely,

Donna Marie Noel

Donna Marie Noel

Responses

Response 4-1

Comment noted.

Response 4-2

Comment noted. No impacts to Rock Creek are anticipated from the Leeville Project.

Response 4-3

Comment noted. BLM concurs with the statement.

Response 4-4

See Responses 1-2 and 1-3.

Response 4-5

Lower Plate rocks in the Leeville Mine are comprised of carbonate units of the Roberts Mountains Formation. These carbonate units will effectively buffer potentially acid producing rock that could be exposed in the shaft walls. The shaft walls will also be lined with concrete, which will place cement in contact with water in the shafts, further adding to the buffering affect of the host rock. See also Responses 1-4, 1-5, and 1-6.

Response 4-6

The BLM complied with all laws and regulations pertaining to protection of cultural resources and Native American Religious Concerns for the proposed Leeville Project. No significant cultural resources or sacred/sensitive traditional lands would be impacted by the Project.

Letter 5

STATE OF NEVADA
DEPARTMENT OF TRANSPORTATION
1951 Idaho Street
Elko, Nevada 89801
(775) 777-2700 FAX (775) 777-2705
KENNY C. GUINN, *Governor*

March 18, 2002

Bureau of Land Management
Elko Field Office
3900 East Idaho Street
Elko, Nevada 89801-4611

1793.7/3809
N16-97-004P

RE: Review of Draft Environmental Impact Statement
Leeville Project

Dear Sir:

5-1 The Nevada Department of Transportation (NDOT) has reviewed the draft of the environmental impact statement. The plan appears to be very comprehensive and addresses many concerns. The document does not appear to address the effects the proposed project may have on the existing transportation system.

The Department requests that transportation analysis should be done and included in the final EIS. The analysis should include both construction and operational phases of the project, so that the proper transportation planning can be accomplished for both.

5-2 The Nevada Department of Transportation is not in opposition to the proposed project, but we are concerned about repercussions to our roadway system. The project could pose funding problems on NDOT and other transportation agencies that provide access to the site. A partnership between Newmont Mining Corporation and NDOT may be necessary to address any impacts found in the analysis.

The Department appreciates this opportunity to comment. If you have any questions please feel free to contact me at 777-2700.

Sincerely,

Mike Glock, P.E.
District Engineer

cc: Kent Cooper, Assistant Director, Planning
Kevin Lee, Assistant District Engineer
Michael E. Murphy, Traffic Engineer – District III

Responses

Response 5-1

The 400 workers during the operational phase of the Leeville Project would mostly come from the existing work force, so there should be little change in traffic patterns. Haul truck traffic would be limited to the North-South Haul Road. No ore processing would occur on-site at the Leeville Project; therefore, shipments of material for processing ore in Newmont's North Area or South Area would remain similar to existing conditions.

Specific shifts of construction workers are not yet known; however, these workers are expected to travel to the area in individual vehicles.

Response 5-2

Highway taxes paid by mining companies and vendor/suppliers are expected to continue at current levels. This revenue could be used to maintain the existing road system.

Letter 6

[illegible] 7:30

Kevin Sur
3506 Valley Ridge Ave.
Elko, Nevada 89801
H-(775) 738-4104

Bureau of Land Management
Elko Field Office
Attn Deb McFarlane
Leevill Project EIS Coordinator
3900 Idaho St.
Elko , Nevada 89801

March 5, 2002

Dear Miss McFarlane,

I would like to express my comments on the Leeville Project.

6-1

1. The Leeville Project will make a valuable economic contribution to the local area economy.
2. The Leeville Project is adjacent to an active mining district and will use existing infrastructure thus minimizing the overall effect on the environment. Mitigation measures have been proposed where impacts to the environment are anticipated.
3. Newmont Mining Corporation has the right to enter the public lands and explore for and exploit mineral deposits under the General Mining Law of 1872.
4. Newmont Mining Corporation is a responsible operator with a long history of operating in an environmentally and socially responsible manner.

I urge the BLM to approve the Leeville Project and issue permits at the earliest possible date.

Sincerely,

Kevin Sur

Responses

Response 6-1

Comment noted.

Letter 7

March 26, 2002

ATTENTION: DEB McFARLANE

Re: Leeville EIS

I am writing this letter as my family has lived in Northeastern Nevada since the 1870's, and I feel I have a vested interest in this area.

I cannot believe that your Agency would allow this mine, or any other mine, to be dewatering. The water they are taking out of the ground is much more valuable than gold, silver, etc., that they are mining. 250 years to recover that underground water is probably a liberal estimate. Can you really justify 18 years of mining with 250 years to recover? The 453 acres of public ground that these people will ruin forever is just the tip of the iceberg. They tie up thousands of acres for their operations, and the public is denied access to those lands. What about 7-1 the other people that use underground water? Do you think that will not affect other people's rights, springs in the area, etc? If you don't then you have not looked at the amount of springs that have dried up in areas where there is dewatering going on.

I don't know what these mines are paying the Federal Government for wrecking havoc on the public lands, but evidently they are not paying their way to the cities and counties they are operating in, otherwise Lander County, Elko County, City of Carlin, City of Elko, etc., would not be cash-strapped. These mines have brought in people from all over, but they have not paid the costs of infrastructure caused by these additional people. They give a few dollars to this and that, and everyone thinks that is wonderful. They show a few pictures of spots that they have put back to some semblance of what the area was before they started mining. However, what about North Fork, Steer Canyon, Jerritt Canyon, Snow Canyon, etc.? Those areas will never be the same.

It isn't bad enough that these mining companies come in here and do whatever they damn well please on public lands, but the majority, if not all, are not even American companies.

I am against allowing any mining company to do dewatering. That fool we have for a State Water Engineer, doesn't approve livestock or irrigation wells for years, but this dewatering business doesn't seem to bother him a bit. Makes you wonder, doesn't it.

Thank you for your time.

FJ Pattani

F. J. PATTANI

739 13th Street
Elko, Nevada

P.S. These are my views and not the view of any of my Pattani relatives.

Responses

Response 7-1

Allocation of water for beneficial use and issuance of water rights are actions under the jurisdiction of the State Engineer.

Letter 8

TE-MOAK TRIBE OF WESTERN SHOSHONE
525 Sunset Street • Elko, Nevada 89801
(775) 738-9251
FAX - (775) 738-2345

BUREAU OF LAND MANAGEMENT
2002 APR 29 PM 2: 19

April 29, 2002

Deb McFarlane
Leeville Project EIS Coordinator
3900 Idaho Street
Elko, NV 89801

Dear Ms. McFarlane,

8-1 Mining of Newmont Mining Corporation's Leeville project will have a highly significant impact on the water sources, plant life, wildlife, and Western Shoshone traditions and culture. Water is life; our creator did not give us water so that we can destroy it. The dewatering process would definitely disrupt all life in the surrounding area of the project. Wildlife depend on the natural "uncontaminated" springs, how is the mining company going to replace the natural springs that Mother Earth has created?

8-2 Rock Creek, a recognized Western Shoshone spiritual and ceremonial area, is located approximately 15 miles west of this proposed project. My concerns are how is the dewatering going to affect Rock Creek and other creeks in this area? Will the cumulative dewatering process of the Betze Project, SOAPA, and Leeville Project run these creeks dry? If this process adversely affects these creeks, how are the mining companies going to insure that these creeks are brought back to their natural state? Relocating native "bah" (water) is not something that the Western Shoshone feel is warranted. Water in desert land is paramount in our concerns because drinkable, swimmable waters serve humans and animals. We believe that all things should be used wisely, used as the Creator intended. Life, water, earth, and air should be left in its natural state, only to be disturbed as needed. The sacred aspect of Rock Creek and how it is going to be affected by the mines is of great concern. The Te-Moak Council recently passed a resolution that states that the Te-Moak Tribe of Western Shoshone will support and help protect Rock Creek and Tosawihi Quarries from future destruction from entities that will endanger the physical and spiritual properties of these sacred places.

8-3 The Western Shoshone people realize that mining is an important economic resource to the state of Nevada. We know that there is a great demand for gold and other mined products. However, we contest that exploration and mining can and should be done using methods that are more conducive to cultural preservation and environmental protection.

If you have any questions, please contact Jennifer L. Bell at (775) 738-8145.

Respectfully submitted,

Jennifer L. Bell

Jennifer L. Bell, Environmental Coordinator
Te-Moak Tribe of Western Shoshone

Cc:
Felix Ike, Te-Moak Chairman
Helen Hankins, Elko District Field Manager
Robert Abbey, BLM-NV State Director
File

Responses

Response 8-1

Please see Leeville Project Mitigation Plan included in this Final EIS as **Appendix A**.

Response 8-2

BLM requested concurrence from SHPO regarding the determination by BLM that the proposed Leeville Project would have no effect on the Rock Creek and Tosawhii Quarries TCP sites. The request was submitted to SHPO on May 1, 2002. In addition, BLM has determined that no visual impacts would occur to site CRNV-01-10842. On June 4, 2002, the BLM received a letter from SHPO that stated it concurs with BLM's determination that the proposed undertaking will not pose an effect to the following historic properties: Rock Creek TCP (CRNV-11-9931), Tosawihi Quarries TCP (CRNV-11-9932), and CRNV-01-10842.

Response 8-3

Comment noted.

Letter 9

New Ordinance

RECEIVED
BUREAU OF LAND MANAGEMENT
ELKO FIELD OFFICE
2002 APR 26 AM 10: 01

Upon introduction and motion by Councilman Myers and seconded by Mayor Franzoia, the following Resolution and Order was duly passed and adopted:

CITY OF ELKO

RESOLUTION NO. 09-02

A RESOLUTION OF THE ELKO CITY COUNCIL IN SUPPORT OF THE LEEVILLE PROJECT AS PROPOSED BY NEWMONT MINING CORPORATION

WHEREAS, Nemont Mining Company has proposed the Leeville Project and;

WHEREAS, this project will result in mining related employment and other economic activity in this region, and;

WHEREAS, the Bureau of Land Management has recently held public hearings to review the Draft Environmental Impact Statement to explain the project, its Impact and possible its alternatives and have asked that comments be submitted prior to April 29, 2002, ;

NOW THEREFORE, IT IS HEREBY RESOLVED AND ORDERED BY THE CITY COUNCIL, CITY OF ELKO, NEVADA:

9-1 **The Elko City Council is in full support of Newmont Mining Corporation's "Leeville Project" as presented in the Draft Environmental Impact Statement by the Bureau of Land Management.**

IT IS FURTHER RESOLVED that this Resolution shall be effective and shall be in force immediately upon adoption, and that upon adoption of this Resolution by the Elko City Council it shall be signed by the Mayor and attested to by the City Clerk.

PASSED AND ADOPTED this 23rd day of April, 2002.

VOTE:

AYES:	Mayor Michael J. Franzoia, Councilman Jim Conner, Glen Guttry, Charles Myers
NAYS:	None
ABSTAIN:	Councilman Lee Hoffman
ABSENT:	None

MICHAEL J. FRANZOIA, MAYOR

ATTEST:

LORI LYNCH, CITY CLERK

Responses

Response 9-1

Comment noted.

Letter 10

COMMISSIONERS

JOHN ELLISON
NOLAN W. LLOYD
MIKE NANNINI
BRAD ROBERTS
WARREN RUSSELL

ROBERT K. STOKES
ELKO COUNTY MANAGER
(775) 738-5398 PHONE
(775) 753-8535 FAX
rstokes@elkocountynv.net

Board of County Commissioners
COUNTY OF ELKO
569 COURT STREET • ELKO, NEVADA 89801

RECEIVED
BUREAU OF LAND MANAGEMENT
ELKO FIELD OFFICE
2002 APR 24 PM 12: 18

April 15, 2002

Ms. Deb McFarlane, Leeville EIS Project Manager
BLM Elko Field Office
3900 East Idaho Street
Elko, Nevada 89801

RE: EIS - Newmont Mining Company Leeville Project

Dear Ms. McFarlane:

10-1 The Elko County Board of Commissioners supports the Newmont Mining Corporation's Proposed Action to develop and operate an underground mine at the Leeville Project in Eureka County, Nevada. Elko County is satisfied that the Draft Environmental Impact Statement identifies concerns and provides protections to address those concerns.

Approval of the Proposed Action will benefit the local economy and protect wildlife and the local environment. This approval will be another example of cooperation between business and government that allows for wise management of public lands. Elko County applauds both Newmont Mining Corporation and the Bureau of Land Management for working together to allow for this appropriate use of lands in our area.

Sincerely,

Brad Roberts

Brad Roberts
Chairman

Responses

Response 10-1

Comment noted.

Letter 11

Comments on Leeville Draft EIS
April 3, 2002

Name: SHARON BYRAM

Address: 876 ASHBURN DRIVE

Phone: 775-778-2854

COMMENT:

11-1 I'VE REVIEWED THE SOCIAL/ECONOMIC BENEFITS OF THE LEEVILLE PROJECT AND BELIEVE IT IS A MUCH-NEEDED PROJECT FOR THE LOCAL COMMUNITIES. THE STATE + LOCAL GOVERNMENTS WILL BENEFIT FROM THE ADDITIONAL SALES + USE TAXES, PROPERTY TAXES, AND NET PROCEEDS TAXES THE LEEVILLE PROJECT WILL GENERATE.

THIS PROJECT ALLOWS CONTINUATION OF EMPLOYMENT FOR MANY CURRENT NEWMONT EMPLOYEES + ADDITIONAL OPPORTUNITIES FOR OTHERS. THIS ADDS TO THE ECONOMIC STABILITY OF THE LOCAL COMMUNITIES.

I SUPPORT THIS PROJECT COMPLETELY -

Signature:

Responses

Response 11-1

Comment noted.

Letter 12

Assemblyman

Comments on Leeville Draft EIS
April 3, 2002

Name: John C Carpenter
Address: Box 190 Elko
Phone: 775-738-9861

COMMENT:

12-1 We absolutely need this project. Any impacts are so minimal compared to economic value they should not hold up project and as matter of fact the project should be put on fast track to help the economic and job base of the area.

Signature: John C Carpenter

Responses

Response 12-1

Comment noted.

Letter 13

Responses

Comments on Leeville Draft EIS
April 3, 2002

Name: Mark Sanders

Address: 3114 Clover Hills Circle, Elko 89801

Phone: 753-8983

COMMENT:

13-1 This looks like a good project that will sustain gold production in our area.

Signature: Mark Sanders.

Response 13-1

Comment noted.

Letter 14

Comments on Leeville Draft EIS
April 3, 2002

Name: Charlie Myers

Address: 560 Bullion Rd Elko NV 89801

Phone: 738-4746

COMMENT:

14-1 As with the majority of Elko Residents, I Support Newmont's Leeville Project. IT is AN important project for Elko And Newmont And hope You will Complete the EIS promptly

Signature:

Response 14-1

Comment noted.

Letter 15

Comments on Leeville Draft EIS
April 3, 2002

Name: Kevin Sur

Address: 3506 Valley Ridge Ave Elko NV.

Phone: 738-4104

COMMENT:

15-1 This is an excellent project.

Newmont is a responsible operator with a long history of operating mines on the Carlin trend.

This project should be approved as presented.

Signature:

Responses

Response 15-1

Comment noted.

Letter 16

Comments on Leeville Draft EIS
April 3, 2002

Name: Jette C Seal

Address: POB 6415 Elko NV 89802

Phone: 753-3650

COMMENT:

16-1 Please support the proposed action.

I do not see any long term adverse effects on the environment by the proposed action

Signature: J C Seal

Response 16-1

Comment noted.

Letter 17

Comments on Leeville Draft EIS
April 3, 2002

Name: Thom Seal

Address: P.O. Box 6415 Elko, NV. 89802

Phone: 753-3650

COMMENT:

17-1 1) Please read the "Mining & Mineral Process Act of 1970" by Congress. It is law.

17-2 2) Do not move the waste dump - do the proposed action.

17-3 3) Is it possible to make a canal like a stream w/ rist raft to slow down the water for wildife, but put in a fish screen at botton to keep fish out.

17-4 4) loss of 38 AUM is insignificant to income taxes the miners will pay.

17-5 5) I see no adverse impact to the environment from the proposed action which I support

Signature: Thom Seal, P.E.

Responses

Response 17-1

Comment noted.

Response 17-2

Comment noted.

Response 17-3

See Alternative A Chapter 2 in the Draft EIS.

Response 17-4

Comment noted.

Response 17-5

Comment noted.

Letter 18

Responses

United States Department of the Interior

FISH AND WILDLIFE SERVICE

NEVADA FISH AND WILDLIFE OFFICE
1340 FINANCIAL BOULEVARD, SUITE 234
RENO, NEVADA 89502-7147

April 29, 2002
File No. BLM 6-4

MEMORANDUM

To: Field Manager, Bureau of Land Management, Elko Field Office, Elko, Nevada (Attn: D. McFarlane)

From: Field Supervisor, Nevada Fish and Wildlife Office, Reno, Nevada

Subject: Comments on the Draft Environmental Impact Statement for Newmont Mining Corporation's Leeville Project, Eureka County, Nevada

We have reviewed the above referenced document which describes Newmont Mining Corporation's (Newmont) plans to develop and operate an underground mine with associated surface support facilities in the Leeville Project area in Eureka County. The proposed project involves development of the mine, construction of a waste rock disposal facility, refractory ore stockpiles, ancillary facilities, rerouting and upgrading an existing road, construction of a water treatment facility, installation of approximately 5.5 miles of pipeline/canal to deliver water to TS Ranch Reservoir and irrigation system, continuation of geologic evaluation and exploration, and rerouting of an existing power line. Surface disturbance would total 486 acres of public (453) and private (33) lands. The mine would extend approximately 2,500 feet below the existing ground level. Dewatering wells would be needed to control water inflow to the mine. Thirty-five dewatering wells are proposed to lower the water table from the current 5,700 feet above mean sea level (AMSL) to about 3,800 feet AMSL. Approximately 360,000 acre-feet of ground water would be removed during the life of the mine which is expected to be 18 years or until 2019. A maximum pumping rate of 25,000 gallons per minute (gpm) is expected during the first two years with a rate of 10,000 to 20,000 during years three through five. Pumping rates are expected to be reduced to 6,000 to 9,000 gpm during year five through eighteen to maintain the depressed water table. Reclamation is proposed to be initiated in 2020 and be completed about 8 years after mining ceases. Ground water recovery from dewatering activities is not expected for 100 years after mining ceases. Dewatering at Leeville would extend the period of 90 percent recovery to the premining water table in the Carlin Trend by about 20 years. We have the following comments and recommendations.

Comments

SPECIFIC COMMENTS

CHAPTER 2. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

Proposed Action

18-1 Mine Dewatering. Page 2-19. The document states that a mine water sump would be constructed on the surface and may contain oily water. This facility should be fenced and covered to prevent oil exposure to migratory birds and other wildlife. This mitigation should be discussed in Chapter 4.

18-2 Mine Dewatering. Water Treatment. Page 2-19. The document states that groundwater would be treated to reduce arsenic concentrations to meet state standards prior to conveyance in the discharge pipeline system. What concentration of arsenic would be present in treated water? Discussion may be needed in later chapters on potential effects of arsenic in water and the aquatic community in the TS Ranch Reservoir, including potential adverse effects to migratory birds that may use that site.

18-3 Mine Dewatering. Water Discharge Pipeline/Canal System. Page 2-19. The document indicates that the pipeline will be buried except in rocky areas. In these rocky areas, the pipeline would be located on the surface. Further discussion is needed on the length of the pipeline segments that would not be buried. Impacts to wildlife movement should then be discussed in Chapter 4.

18-4 Waste Rock Disposal Facility. Page 2-20. The document states that segregation of potentially acid-generating (PAG) waste rock is not usually possible due to the nature of underground mining. Later the document indicates that PAG material would be encapsulated. It is unclear as to how this material can be adequately encapsulated if it cannot be segragated.

18-5 Resource Monitoring. Water Resources. Page 2-25. This section indicates that water resources in the Leeville Project area are monitored as a part of Barrick's and Newmont's approved Plans of Operations. We have indicated in comments provided in response to the Draft Supplemental Environmental Impact Statement (EIS) for the Betze Project and the Draft EIS for the South Operations Area Project Amendment that additional water monitoring wells and data collection may be necessary to adequately monitor impacts from these two projects. The addition of the Leeville Project may require additional monitoring to determine impacts from this project. This should be considered, discussed, and mitigation plans provided, reflective of these additions.

18-6 Reclamation. Monitoring/Evaluation of Reclamation Success. Page 2-36. We recommend that evaluation of vegetation growth be monitored for at least 3 years instead of "during three full growing seasons" following planting as indicated. Consideration and discussion is needed for success criteria and corrective actions if success is not achieved.

Responses

Response 18-1

See Response 3-3.

Response 18-2

The proposed water treatment plant would reduce arsenic concentrations in dewatering water to meet current State of Nevada standards set by the Nevada Division of Environmental Protection (NDEP).

Response 18-3

Total length of the pipeline would be 34,700 feet (6.7 miles). Three locations along the pipeline corridor are considered too rocky to bury the pipeline. The pipeline would be constructed above ground at these locations. Approximately 10,000 feet of pipeline would be above ground. The approximate length of each section is 5,000 feet, 1,000 feet, and 4,000 feet. Wildlife is expected to navigate around the above-ground sections of the pipeline.

Response 18-4

Mining advance (in either ore or waste rock) in underground mines is less flexible in terms of scheduling than surface mining operations. Restricted areas of advance limit the scheduling for removal of various waste rock types. It is necessary to mine whatever rock is at an individual face of advance. Placement of waste rock on the waste rock disposal facility will be selective. Overall patterns of PAG and non-PAG waste can be predicted and non-PAG waste will be selectively placed on the bottom and sides of the facility. The thickness of the bottom, side, and top encapsulating layers will be, at a minimum, 10 feet. The facility will be constructed in 25 foot lifts with final side slopes constructed to an overall slope of approximately 2.5H:1V. PAG material will be placed in the center of the facility. See also Response 1-7 through 1-10 and the Leeville Project Mitigation Plan in **Appendix A** of the Final EIS.

Response 18-5

Commitments to expand current monitoring programs for both the SOAPA and Leeville projects have been made by Newmont. See the Leeville Project Mitigation Plan in **Appendix A** of the Final EIS, and page 4-32 under Potential Mitigation and Monitoring Measures in the Draft EIS.

Response 18-6

See Response 3-8.

Comments

CHAPTER 3. AFFECTED ENVIRONMENT FOR PROPOSED ACTION AND ALTERNATIVES

Introduction

18-7 Page 3-1. Why are Floodplains listed as not being affected? Water discharges to the Humboldt River seem to have the potential to affect the Humboldt River floodplain.

Water Quantity and Quality

18-8 Dewatering Rates for Three Major Mines in Carlin Trend. Figure 3-7. It would be helpful to show the cumulative dewatering rates for these three mines in this figure for later reference when dealing with cumulative effects.

18-9 Surface Water Quantity. Marys Creek. Page 3-32. Gaging station Marys-0 is said to be located 0.7 miles above the confluence with the Humboldt River, whereas on Figure 3-5 it is shown near the headwaters. Please make the appropriate correction.

18-10 Surface Water Quantity. Table 3-12. Page 3-36. Please indicate why there are two columns for Maggie Creek Downstream. Is one for flow without dewatering discharge and the other with dewatering discharge?

18-11 Water Quality Standards. Table 3-15. Page 3-39. The numerical values for nitrate and nitrate are incorrect and should be reversed. In the text, with regard to this table, it should also be stated that there are "Requirements to Maintain Existing Higher Quality" for these reaches of the Humboldt River for some parameters that are more restrictive than those provided in the table. It would be helpful to present that information in the table.

18-12 Surface Water Quality. Page 3-40. Information is provided on elevated arsenic concentrations, that are due in part to exposure and weathering of rock from mining related activities in disturbed areas. The potential for elevated exposure and adverse effects to living resources should be addressed in later sections of the document.

Responses

Response 18-7

The Proposed Action and alternatives do not propose to discharge excess water to the Humboldt River unless the capacity of the Boulder Valley irrigation/infiltration system is exceeded and if the State Engineer authorizes discharge to the river. If discharge to the Humboldt River is requested and approved, a portion of the dewatering water would report to the river. Potential impacts to the floodplain of the Humboldt River as a result of mine dewatering discharges are described in the CIA (BLM 2000a).

Response 18-8

Refer to new Table 4-7, *Summary of Cumulative Mine Dewatering Rates in the Carlin Trend*, located in **Errata** in Chapter 3 of the Leeville Project Final EIS.

Response 18-9

Figure 3-5 has been revised to show the USGS gaging station near the mouth of Marys Creek. See **Errata** in Chapter 3 of the Leeville Project Final EIS.

Response 18-10

Yes as stated in footnote no. 1, lower Maggie Creek has been influenced by mine dewatering discharges since 1994. Therefore, the first column under "Maggie Creek Downstream" is flow data prior to 1994, and the second column includes all flow data through 1999 to show the influence of the discharges.

Response 18-11

Table 3-15 has been revised to show the correct water quality standards for Nitrate and Nitrite. See **Errata** in Chapter 3 of the Leeville Final EIS. Language regarding maintaining existing higher quality is not added to Table 3-15 because it is not in the Nevada Administrative Code for these Control Points.

Response 18-12

Comment noted. Arsenic concentrations in rock in the Leeville Project area are sufficiently high to account for concentrations measured in water in Rodeo Creek. See Response 1-18 regarding natural background concentrations of arsenic in rock at the Leeville Project site. Development of the Leeville Project is not expected to increase the potential for release of arsenic and therefore no increased effect to biological resources is expected.

	Comments	Responses
	Springs and Seeps	
18-13	Page 3-41. The document indicates that four springs are located within the project boundary. This section should clearly indicate the number of springs within and outside of the boundary that could be impacted directly or indirectly due to the project. Vegetation types at these sites should be described and possibly reiterated under Vegetation. This is important in understanding the full impacts to springs and seeps from ground water depletion, in particular the values of individual water sources that would be affected and the types of organisms associated with them. In the second paragraph, change Tuscaloosa to Tuscarora.	**Response 18-13** Potential impacts to springs and seeps are discussed in Chapter 4 (page 4-23) of the Draft EIS. Figure 4-2 in the Draft EIS shows the area of additional groundwater drawdown predicted for the Leeville Project. Those springs within the additional drawdown area, and below 6,000 feet elevation as shown on Figure 4-2, potentially could be affected by Leeville dewatering. As stated on page 4-23, however, these springs/seeps "either have already been impacted by regional mine dewatering or have not been impacted because they are associated with the shallow, perched water table system." This perched system is generally shown on Figure 4-2 as the shaded area over 6,000 feet elevation. Vegetation associated with springs is described in the "Wetland/Riparian Zones" section of the Draft EIS (pages 3-64 and 4-38). Tuscaloosa has been changed to Tuscarora (see **Errata** in Chapter 3 of the Leeville Project Final EIS for page 3-41).
	Vegetation	
18-14	Pages 3-61 to 3-63. This section needs to clearly identify plant communities and acres of each. Vegetation based on soils can be very misleading in the number of acres actually covered by vegetation. It should be possible to indicate the impacts to vegetation acres by each facility or activity.	**Response 18-14** Range site conditions portray the vegetative communities including typical amounts of canopy cover. Table 3-21 of the Draft EIS provides a breakdown of each range site within the Project area. It would be possible to delineate specific acres of each vegetative type that would be disturbed by each facility or activity; however, such an extensive level of information is not necessary to adequately describe the potential impacts.
	Threatened, Endangered, Candidate, and Sensitive Species	
18-15	Candidate and Sensitive Species. Page 3-73. Additional information on the status of species of birds of interest may be obtained from the Great Basin Bird Observatory, One East First Street, Suite 500, Reno, Nevada 89501. For example, they may have recent accounts of breeding ospreys and other species in the Humboldt River basin.	**Response 18-15** Comment noted.
18-16	Candidate and Sensitive Species. Sage Grouse. Page 3-75. Pursuant to your Policy Manual, section 6840, Special Status Species Management, we recommend sage grouse be treated as if it were a candidate for listing under the Endangered Species Act of 1973, as amended, so that the likelihood of its being listed is not increased. Loss of springs, seeps, riparian vegetation, and other habitat associated with dewatering will only further adversely impact this species.	**Response 18-16** Comment noted. Sage grouse are a BLM candidate species and under BLM policy are treated as if they are a candidate for listing under the ESA. Potential impacts from the proposed Leeville Project are not anticipated to increase the likelihood that sage grouse would be listed under the ESA.
18-17	Candidate and Sensitive Species. Springsnails. Page 3-76. This discussion should include whether snails have been collected and identified and whether they are endemic to the springs to be impacted by the proposed project.	**Response 18-17** Comment noted. Studies have been completed to collect and identify springsnails in springs within the Project area (see McGuire 1995). See also Chapter 4 discussion on potential impacts to springsnails.
	Recreation and Wilderness	
18-18	Recreation. Page 3-80. Ruby Lake National Wildlife Refuge is listed on Figure 3-17; however, no mention of this site is included in the narrative.	**Response 18-18** Comment noted. No impacts to Ruby Lake National Wildlife Refuge are anticipated.
	Noise	
18-19	Page 3-85. Are noise levels for the larger equipment currently used in mining activities consistent with that which was present in the study cited that was conducted more than 20 years ago?	**Response 18-19** Yes.

Comments

CHAPTER 4. CONSEQUENCES OF THE PROPOSED ACTION AND ALTERNATIVES

Introduction

18-20 Existing and Reasonably Foreseeable Mining Disturbance in the Carlin Trend. Table 4-1. Page 4-5. Sites 33 and 34 are mentioned in Figure 4-1, but not in Table 4-1.

Geology and Minerals

18-21 Potential Mitigation and Monitoring. Page 4-11. Monitoring of the waste rock facility for 30 years after reclamation is completed is appropriate. We recommend that additional language be inserted to specifically indicate that seepage should be chemically analyzed for a broad array of metals and trace elements and data on flow rates should be collected. If problems are detected more than 20 years post closure, then the period of monitoring should be extended beyond the original 30 year period until such time that the problem ceases or is corrected.

Air Quality

18-22 Mercury Emissions. Pages 4-13 and 4-14. Mercury emissions over the life of the mine should be estimated. If the yearly amount is 90 pounds per year, the cumulative amount for 18 years would be 1,620 pounds. The release of one ton of mercury and mercury compounds to the air by mining operations in the Carlin Trend (see Cumulative Effects) is considered to be significant and unacceptable. Therefore, air quality monitoring in relation to these sources should be required. In addition, monitoring of water, soil, vegetation, aquatic macro-invertebrates, and aquatic and terrestrial vertebrates should be required in upwind and downwind areas over an extended period of years to determine trends, if any, in mercury residues. Residual adverse effects from mercury emissions should be acknowledged.

Water Quantity and Quality

18-23 Representative Groundwater Quality for Dewatering at Leeville Project. Table 4-5. Page 4-24. No information is provided here (as was the case in Table 3-18) for copper, lead, molybdenum, nickel, and silver. Information is needed on these constituents in order to determine if they meet aquatic life standards and NPDES permit limits and whether or not treatment for these constituents would be needed. If these or other constituents do not meet aquatic life standards, then the possibility of elevated exposure to birds through the food chain should be considered. For example, birds may use TS Ranch Reservoir. Potential exposure to aquatic and terrestrial organisms related to possible discharges to the Humboldt River should also be discussed.

18-24 Potential Mitigation and Monitoring Measures. Page 4-32. In the fourth paragraph, we recommend that monitoring Beaver Creek flow in Maggie Creek basin occur because of the projected cumulative groundwater drawdown in the area due to Leeville.

Responses

Response 18-20

Sites 33 and 34 are exploration projects and are listed in the footnote to Table 4-1.

Response 18-21

Comment noted.

Response 18-22

Comment noted. Please note that ore processing would not occur at the Leeville Project site. NDEP concluded in their analysis of mercury emissions contained in "Mercury Emissions from Major Mining Operations in Nevada NDEP; November 2000" that "there is currently no imminent and substantial public health threat associated with mercury emissions in the region. The NDEP will continue with it's current Hg monitoring efforts and will continue to track the monitoring efforts of other agencies." NDEP also indicates "Specific regulatory requirements for the control of mercury emissions at mining facilities have not been established by the EPA or the State of Nevada." NDEP is continuing to work with mining operations to limit mercury releases to the air (NDEP 2000). Leeville ore would be blended with Gold Quarry ore at the mill facility, and there would be no change in process rate or permitted emission limits. See also Response 1-20.

Response 18-23

Tables 3-18 and 4-5 have been revised (see Errata in Chapter 3 of this Final EIS) to incorporate groundwater quality data for copper, lead, molybdenum, nickel, and silver. Results of the laboratory analyses show that molybdenum may exceed the aquatic life standards, and nickel may exceed the drinking water standard. For molybdenum, however, nine of the 12 samples collected and analyzed from wells HDDW-1A, HDDW-2, and HDDW-3 were below the laboratory detection limit, two samples had a concentration of 0.01 milligrams per liter (mg/L), and one had a concentration of 0.05 mg/L. The aquatic life standard for molybdenum is 0.019 mg/L. Therefore, one sample out of the 12 total samples exceeded the molybdenum standard for aquatic life. For nickel, nine of the 12 samples collected and analyzed were below the laboratory detection limit. The other three samples had nickel concentrations of 0.02 mg/L, compared to the drinking water standard of 0.0134 mg/L. Based on these and other concentrations of chemical constituents in groundwater at the Leeville Project site (Tables 3-18 and 4-5), no adverse impacts are expected from the quality of groundwater that would be discharged from Leeville's mine dewatering system. Potential impacts from mine discharges to the Humboldt River are described in the Cumulative Impact Analysis (CIA) document (BLM 2000a).

Response 18-24

See Leeville Project Mitigation Plan in Appendix A of the Final EIS.

Comments

18-25 The last sentence of the fifth paragraph indicates that the water monitoring program would be evaluated and revised "periodically" after review of water quality and quantity data and updated model results. How is "periodically" to be defined? We recommend that a specific time frame be established for review and evaluation of these data.

18-26 If arsenic concentrations in Rodeo Creek continue to rise, presumably as a result of mining activities, mitigation of some sort should be initiated.

Vegetation

18-27 Direct and Indirect Impacts. Proposed Action. Page 4-36. The first, second, and third paragraphs of this section should discuss the acreage and types of vegetation impacted by the proposed project. The amount of area not revegetated/reclaimed due to particular facilities should be stated and reiterated under the Irreversible and Irretrievable Commitment of Resources section on page 4-37.

18-28 The shallow soil cover on the waste rock disposal facility may allow for root penetration into the waste rock. This could result in elevated rates of uptake of metals and trace elements by the vegetation and eventual exposure to herbivorous wildlife. The cover material could also be easily penetrated by burrowing mammals, resulting in direct exposure to waste rock by such species. Little or no information on this subject is available for mines in arid Nevada. Research on this subject is clearly needed prior to numerous decisions on mine closure in the future. This potential source of contaminant exposure to terrestrial wildlife should be discussed in the section on that topic.

18-29 Residual Adverse Effects and Impacts of Mitigation. Page 4-37. Please indicate the types of plant community changes that may result from long-term flow reduction.

Terrestrial Wildlife

18-30 Potential Mitigation and Monitoring Measures. Page 4-45. The administrative draft EIS indicated wildlife monitoring programs at the adjacent Lantern complex would be applied to the Leeville project area. We note that this paragraph has been eliminated from the draft EIS. This program monitors wildlife mortality and reports wildlife losses to the Nevada Division of Wildlife (NDOW). If additional mitigation is necessary, measures will be determined with the Bureau of Land Management (BLM) and NDOW. We strongly support continuing this program in the Leeville Mine project area, and it should be reinstated in the EIS.

Responses

Response 18-25

See Leeville Project Mitigation Plan in **Appendix A** of the Final EIS.

Response 18-26

Arsenic concentrations in Rodeo Creek, during1995-98, remained relatively constant, ranging from 0.10 to 0.20 milligrams per liter (mg/l) in six samples. The most recent sample, collected in early 2000, had a concentration of 0.31 mg/l. No samples have been collected since then due to dry conditions. No new surface disturbances in the Leeville Project area have occurred since about 1997, and several exploration roads were reclaimed in 1996-97. The anomalously high sample collected in 2000 is probably indicative of the natural variation of arsenic concentrations in Rodeo Creek at this location, but until additional samples are collected, this cannot be determined.

As discussed in Response 1-18, the upper Rodeo Creek area at the Leeville Project site has elevated concentrations of arsenic in the rock (mean value of 375 parts per million from 2,219 rock samples). Best management practices for the Leeville Project are expected to prevent increased erosion and arsenic concentrations in upper Rodeo Creek. Rodeo Creek will be sampled for arsenic and mitigated if problems are detected (see Leeville Project Mitigation Plan in **Appendix A**).

Response 18-27

See Responses 3-6 and 18-14.

Response 18-28

Comment noted. The amount of material that has the potential to release metals or would be potentially acid-generating (PAG) is approximately 11.4 percent of the total tonnage to be extracted from the Leeville Project. This tonnage would be managed such that it would be encapsulated inside the waste rock disposal facility. Encapsulation would be beyond rooting and normal burrowing depth for small mammals. See also Response 1-7.

Response 18-29

Plant community types would generally change from mesic to xeric types. Depending on the length of time that flow is lost from a particular site, it is likely that upland plant communities would become established. The DEIS does not project that dewatering at Leeville will have any incremental impacts on surface water flow that would adversely affect vegetative types, other than to prolong recovery of already affected water.

Response 18-30

Newmont is required by the Nevada Division of Wildlife (NDOW) to report all wildlife mortality on Newmont operations, regardless of the location of the mortality.

	Comments	Responses
18-31	In the last paragraph, we recommend that the word "should" in the first sentence be changed to "shall" in relation to constructing devices on Sierra Pacific Power Company's power line. Measures to reduce bird collisions with this power line should also be included.	**Response 18-31** The relocated power line would be constructed the same as the existing power line traversing the Project site. As indicated in the Leeville Project Mitigation Plan in **Appendix A** of the Final EIS, *"Predatory bird perch deterrents will be installed on all power lines to be built as a result of the Leeville Project. This action will mitigate the effects of potential predatory bird perch areas within sage grouse habitat. Perch deterrent designs would be completed through consultation with BLM and NDOW biologists."* The relocated power line would have the same potential for bird collisions as the existing power line; therefore, relocation of the power line would not cause a new impact to the environment.
18-32	Information should be provided on prevention of bird exposure to oily water in the mine water sump.	**Response 18-32** See Response 3-3.
	Threatened, Endangered, Candidate, and Sensitive Species	
18-33	Direct and Indirect Impacts. Proposed Action. Bald Eagle. Page 4-46. This section needs to address the relocation of a power line and the potential for electrocution and collision by bald eagles (as well as golden eagles). Mitigation measures need to be presented in the Potential Monitoring and Mitigation Measures section beginning on page 4-50 to avoid or minimize those impacts. There is the potential for slightly increased metal and trace element exposure to bald eagles from possible discharges of water to the Humboldt River.	**Response 18-33** See Response 18-31. Also see cumulative impacts analysis in the CIA (BLM 2000a) for information on trace element exposure in the Humboldt River.
18-34	Direct and Indirect Impacts. Lahontan Cutthroat Trout. Page 4-47. The BLM is fully aware of the Service's concerns related to mine dewatering and any direct, indirect, or cumulative impacts on LCT in the Humboldt River Distinct Population Segment based on comments provided to them in association with the Draft Supplemental EIS for the Betze Project, the Draft EIS for the South Operations Area Project Amendment, and the Cumulative Impact Analysis of Dewatering and Water Management Operations for the Betze Project, South Operations Area Project Amendment, and Leeville Project. As such, we recommend BLM review this project, too, for all impacts that it may have on riparian and aquatic habitats as they relate to LCT, and that BLM consult with the Service accordingly under section 7 of the Act.	**Response 18-34** Section 7 Consultation will be completed with U.S. Fish and Wildlife Service.
18-35	Direct and Indirect Impacts. Sage Grouse. Page 4-48. We are concerned about this species which could be petitioned for listing. Loss of springs, riparian vegetation, and other habitat associated the mining and dewatering will further impact this species which has been significantly impacted by habitat lost by fires in the last couple of years.	**Response 18-35** Comment noted.
18-36	Direct and Indirect Impacts. Springsnail. Page 4-48. Information is needed here as to whether springsnail populations will be impacted by the project. Such information is also lacking in the section on Cumulative Effects. If adverse effects are anticipated, monitoring and mitigation measures should be developed.	**Response 18-36** As stated in the Draft EIS, dewatering associated with the Leeville Project is not predicted to have a direct or indirect impact on springsnail populations in the Carlin Trend (see page 4-48). Springsnails do occur in springs that are located within the cumulative cone of depression created by adding all dewatering programs together. Potential impacts of cumulative dewatering could include reduction or loss of flow at these spring(s), and subsequent loss of individual snails and their habitat. The Leeville Project would not add an incremental impact to predicted cumulative impacts to springsnails.
18-37	Potential Monitoring and Mitigation Measures. Page 4-51. Due to concerns related to sage grouse, specific mitigation measures should be proposed to avoid or minimize any potential impacts. Populations should be monitored and habitat enhancement/protection measures should be implemented.	**Response 18-37** Comment noted. There are minimal impacts to sage grouse predicted and BLM monitors sage grouse leks annually.

Comments

Grazing Management

18-38 Potential Mitigation and Monitoring Measures. Page 4-52. In the second sentence of the first paragraph and the second sentence of the second paragraph, the word "should" should be changed to "will".

Field Manager File No. BLM 6-4

We appreciate the opportunity to comment on this draft EIS. If you have any questions, please contact me or Stanley Wiemeyer for issues regarding environmental contaminants or Marcy Haworth for issues related to general wildlife and threatened and endangered species at (775) 861-6300.

Robert D. Williams

cc:
Administrator, Nevada Division of Environmental Protection, Carson City, Nevada
Administrator, Nevada Division of Wildlife, Reno, Nevada
State Director, Bureau of Land Management, Reno, Nevada
Chief, U.S. Army Corps of Engineers, Reno Field Office, Reno, Nevada
Chief, Office of Federal Activities, Environmental Protection Agency (CMD-2), San Francisco, California (Attn: J. Geselbracht)
Assistant Regional Director, Ecological Services, Fish and Wildlife Service, Portland, Oregon (Attn: D. Steffeck)
Operations Manager, California/Nevada Operations Office, Fish and Wildlife Service, Sacramento, California

Responses

Response 18-38

The term "will" applies to those actions for which the applicant has received an authorization to proceed or describes a commitment that is part of a permit or record of decision that is or has been issued. "Should" describes activities that may or may not be required of the applicant. See the Leeville Project Mitigation Plan in **Appendix A** of this Final EIS.

Letter 19

Great
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April 29, 2002

Bureau of Land Management
Elko Field Office
Attention: Deb McFarlane
Leeville Project EIS Coordinator
3900 Idaho St.
Elko, NV 89801

Via Certified Mail: 7001 1140 0000 8088 0952

Re: Comments on the draft EIS, Leeville Project

Dear Ms. McFarlane:

Thank you for the opportunity to review the subject DEIS. This letter represents the comments of Great Basin Mine Watch on this project. The Mineral Policy Center of Washington, D.C. join in these comments.

Our primary concerns around this project are with the dewatering impacts of the project and the sulfidic ore and waste rock that will be brought to the surface from deep deposits. Dewatering at Leeville will add to the impacts of dewatering at Newmont's Gold Quarry mine and Barrick's Betze/Post mine. Newmont should focus on decreasing the need for dewatering with the use of grouting. This is discussed in detail below.

19-1 The entire draft EIS (DEIS) is based on a potentially faulty premise that Newmont's Gold Quarry Expansion will be approved as proposed. As of this writing, the final EIS (FEIS) for Gold Quarry has not been issued. It is possible that the Gold Quarry proposal will not be constructed either for environmental or economic reasons. The following passage outlines that concern:

> In order to separate potential impacts to water resources associated with the proposed Leeville Mine from impacts associated with all other Carlin Trend area dewatering, HCI (1999b, 1999d) simulated regional dewatering with and without the Leeville Project. By comparing two modeled drawdown areas, it is possible to determine where groundwater drawdown has increased due to the projected Leeville dewatering system. The area of drawdown in the water table aquifer

These 1999 HCI reports are based on the Gold Quarry expansion. The existing condition for the proposed action considered in this DEIS should include just the current approvals at Betze/Post and Gold Quarry. If Gold Quarry does not expand, the required pumpage for Leeville will be much greater than for the proposed action. The drawdown and extent of the 10-foot drawdown due specifically to Leeville will be much greater. Because the BLM assumed that Gold Quarry will expand, the impacts attributed to Leeville are underestimated.

Responses

Response 19-1

The Final EIS for the South Operations Area Project Amendment (SOAPA) was released to the public on April 26, 2002. The analysis contained in the Leeville Draft EIS accounts for all historic and reasonably foreseeable groundwater withdrawals from the Carlin Trend area. If, as the reviewer suggests, the Gold Quarry expansion (SOAPA) did not occur, less water would be withdrawn from the cumulative area resulting in lesser potential impacts. It does not follow that a reduction in pumping at Gold Quarry results in an increased pumping requirement at Leeville. Water level declines in the Leeville area to date have been primarily attributable to pumping at the Barrick Goldstrike Mine (see Response 9-13). As shown on Figure 3-7 of the Draft EIS, pumping rates at Leeville do not increase after pumping at Gold Quarry and the Betze/Post and Meikle mines end.

Comments

The second possibility is that Gold Quarry will receive the needed approvals but not be built for economic reasons. It could be that Newmont will choose to mine the high value ore at Leeville rather than the low value ore at Gold Quarry.

19-2 Therefore, the BLM should redo the Leeville DEIS to include an analysis of impacts as though Gold Quarry will not expand. Without such an analysis, the FEIS and ROD would be based on impacts that were never analyzed. The following points and questions should be addressed with the current approvals at Betze/Post and Gold Quarry as existing conditions:

19-3 1. How much pumpage will Leeville require if Gold Quarry does not expand?

19-4 2. What is the extent of the ten-foot drawdown cone due to Leeville.

19-5 3. Provide a drawdown contour map showing the drawdown caused by Leeville above and beyond (or is that below and beyond) that caused by the existing conditions.

19-6 4. Estimate the effect on streams due to just Leeville with the existing conditions.

In a revised or new DEIS, the BLM should also analyze the potential minimization of impacts that would result from a **reliance on grouting** rather than dewatering as has been done at mines all around the world. As will be discussed below, grouting is environmentally preferable and the justification provided by Newmont and accepted by the BLM for not analyzing it as an alternative is grotesquely simplified and insufficient for a legal NEPA analysis.

Our comments are grouped as follows. First, we discuss dewatering which includes a discussion of cumulative impacts, legal issues and grouting. Second, we discuss the sulfidic rock and the need for backfill. Finally, we provide more general comments on the DEIS. Also, we commissioned a review of the DEIS by Mr. Jim Kuipers of the Center for Science in Public Participation. A review prepared by Dr. Tom Myers in his capacity as a consultant for the Center for Science in Public Participation of the Carlin Trend groundwater model is attached as Attachment 1. His memorandum report, subject "Comments on Leeville Project Draft Environmental Impact Statement" is attached as Attachment 2. Whether specifically quoted or referenced or not within the body of the letter, the comments and analysis in each attachment stand on their own as comments by Great Basin Mine Watch on the Leeville DEIS and the cumulative impacts of mining the Carlin Trend.

Dewatering

The Leeville Project will remove up to 360,000 af from the aquifers surrounding the mine. This is more than 15 times the natural recharge in the basin and will increase the depth of drawdown and increase the length of time until recovery of groundwater in the Carlin Trend occurs.

19-7 The predictions of the impacts of dewatering were determined with a groundwater flow model of the Carlin Trend prepared by Hydrologic Consultants, Inc. in 1999. It is the same model that had been prepared for the Gold Quarry expansion and used in the BLM's cumulative impacts report for that and this mine proposal. For the SOAPA DEIS, Great Basin Mine Watch commissioned a review of the model that was provided to the BLM in comments on the SOAPA DEIS. In that the BLM has not yet responded to those comments, and to include them in the administrative record for this action, we have attached the comments to this letter. The report prepared using the same model for Leeville was:

Responses

Response 19-2

Potential impacts associated with the combined dewatering for SOAPA, Betze/Post, and Leeville have been analyzed. Elimination of future dewatering at SOAPA would result in lesser impacts than those described for the combination of the three dewatering systems.

Response 19-3

As shown on Figure 3-7 of the Draft EIS, pumping requirements for the Leeville Project are independent of Gold Quarry dewatering rates. The Leeville Project is located within the central hydraulic zone of the Carlin Trend; bounded on the south by the Tuscarora Fault and on the north by the Goldstrike granodiorite intrusive. These two boundary features more or less isolate groundwater in the central zone, in the carbonate unit at depth. Drawdown resulting from mine dewatering at the Goldstrike Property influences groundwater within the central zone. Groundwater flows around the Goldstrike Intrusive to the north, which has resulted in a steady drawdown within the carbonate rocks at Leeville. In essence, the intrusive serves as a leaky boundary to ground water flow.

The Tuscarora Fault is a much more effective barrier to groundwater flow. Pre-dewatering heads to the north of the fault, within the central hydraulic zone, were 200 feet higher than those to the south, on the Gold Quarry side. As dewatering has progressed within the carbonate rocks it is clear that the Tuscarora Fault is a boundary to groundwater flow. South of the fault, changes in water levels in the carbonates can be correlated to pumping rate changes at Gold Quarry. North of the fault, water level declines in the carbonate consistently show a gradient to the north, towards the Goldstrike intrusive. Carbonate water levels remain 200 feet higher north of the Tuscarora Fault than on the south.

Response 19-4

The extent of the drawdown cone as a result of Leeville Project dewatering would be the same as depicted in the Draft EIS (Figure 4-2).

Response 19-5

See Figure 4-3 in the Draft EIS.

Response 19-6

See *Impacts to Surface Water Quantity* in Chapter 4 Water Quantity and Quality of the Draft EIS.

Response 19-7

Comment noted. Responses to the groundwater flow model comments follow.

Comments

Hydrological Consultants, Inc., 1999. Numerical Ground-water Flow Modeling of Leeville Project, Eureka county, Nevada. Prepared for Newmont Gold Company, HCI-878, July 1999. Hereinafter "Leeville Model Report".

19-8 That review did not consider the prediction of dewatering rates at Leeville. Section 5.1, Predicted Dewatering Rates for Leeville Mine, in HCI's Leeville model report describes the method used. While the description is sparse, it appears that a trial and error approach was used.

19-9

> Mine plans...defined the lowest elevation of the underground workings at the end of each year through 2012. From the year 2012 through the end of the year 2017, it was assumed that the mine maintained the same lowest elevation. These elevations, less 50 ft for freeboard, were the target fo the simulated dewatering operations. The ...model was then used to predict the amount of ground water that would have to be extracted by assigning the target elevations to several specified head nodes in the Leeville Mine area. Leeville Model Report at 66.

Presumably, the modelers then used a set of pumping nodes at different levels in the aquifer to lower the level to the target level. A more appropriate method would be to use drain boundaries (a subroutine in MODFLOW; we do not know the methodology in HCI's proprietary code) set at the target elevations at various nodes around the mine. This amount of water removed from the model at each node would then be the required pumpage. This would allow Newmont to optimize the required pumpage.

19-10 The Leeville Model Report relies on the assumption that the Gold Quarry mine will expand as proposed. Until that project is approved and being constructed, as discussed above, it is an inappropriate baseline condition for the analysis of this project.

19-11 Most of the dewatering water will be used for irrigation or infiltration. However, the EIS states that "[d]ischarge would not be allowed to the Humboldt River unless authorized by the State Engineer and only if the excess water cannot be removed via infiltration, injection, and /or irrigation." DEIS at 2-19. Because allowing such a discharge would **significantly change the environmental impacts** associated with the project, the BLM should provide a description of the process by which the State Engineer would authorize such discharge. Also, because the BLM does not analyze the environmental impacts associated with such a discharge, it would **represent a significant change to the plan and should undergo new NEPA analysis** prior to being allowed. Please address the need for NEPA in the FEIS if such discharge becomes necessary.

19-12 The discussion of dewatering amounts is incorrect. The DEIS indicates that dewatering for Gold Quarry "has ranged from 4,000 to 20,000 gpm... with an expected future rate averaging 10,000 gpm." DEIS at 3-22. It also states that dewatering at Gold Quarry "is expected to continue through 2011." Id. However, Figure 3-7 shows that Gold Quarry will dewater at 20,000 gpm until 2013 countering both of these statements. The Gold Quarry expansion DEIS also indicates that 20,000 gpm is the predicted dewatering rate. SOAPA DEIS at 4-12.

19-13 In the summary, the BLM claims that 212,000 acre-feet will be "infiltrated into the Boulder Valley via irrigation". The implication is that this infiltration helps to offset the dewatering; this is incorrect. The BLM should determine how much of the water infiltrated into the alluvium of Boulder Valley will be available to make up the deficit created by dewatering the lower aquifers. In other words, determine and discuss the connection between the alluvial and bedrock aquifers in Boulder Valley. The BLM should run the Carlin Trend groundwater model to determine the amount of water that will flow

Responses

Response 19-8

Predicting the potential effects of dewatering associated with the proposed Leeville Project was the basis of the review and analysis contained in the *Water Quantity and Quality* section of Chapter 4 in the Draft EIS.

Response 19-9

BLM is satisfied that the Carlin Trend groundwater model performed by Hydrologic Consultants, Inc. (HCI 1999c) was properly used to calculate the dewatering rate necessary to achieve a dry Leeville Mine. The model will continue to be reviewed in future calibrations (every two years) to ensure accuracy.

According to Anderson and Woessner (1992, page 120), "Specified head nodes may also be used to represent drain nodes if the head in the aquifer never falls below the drain." Either method will produce the proper result.

Response 19-10

See Response 19-1 and 19-3.

Response 19-11

Potential impacts to the Humboldt River or other surface water features from mine dewatering discharge to the Humboldt River are described in the Cumulative Impact Analysis (CIA) report (BLM 2000a).

Response 19-12

Comment noted. See Chapter 3 **Errata** in this Final EIS for page 3-22 corrections to Gold Quarry dewatering.

Response 19-13

As stated in the Summary on page 4-16 of the Draft EIS, "Approximately 212,000 acre-feet of water would be infiltrated into Boulder Valley using the water management system over the life of the Leeville Project." Implicit in the cumulative impact predictions contained in the CIA (BLM 2000a) and in the summary of cumulative effects in the Draft EIS (page 4-30) is the fate of water infiltrated in Boulder Valley. Predicted drawdown and recovery within the cumulative impact area includes the fate of the infiltrated water, as this is included in the groundwater model. Returning water pumped for dewatering to the groundwater basin of origin is consistent with the Nevada State Engineer's policy for disposition of dewatering water.

The connection of the alluvial and rhyolite aquifers in Boulder Valley with the carbonate aquifer that will be dewatered by Leeville is apparently limited. As described in Maurer et al. (1996), the carbonate aquifer is bounded laterally by faults, intrusives, and other geologic structures. Vertically, it is isolated by the Roberts Mountains thrust fault and overlying lower permeability sedimentary rocks (i.e., Carlin and Vinini formations). A major structure, the Siphon Fault, strikes between the Boulder Valley aquifers and the Leeville area, effectively isolating the carbonate at Leeville (see Response 19-3 for additional discussion of compartmentalization of the carbonate aquifer) from the area of infiltration.

Comments

19-14 from upper layers to lower layers. The BLM should also determine how much of the infiltrated water seeps to the Humboldt River? We have seen seeps on the north bank of the river and suspect it currently is due to the mounding being created in the valley. Models run by Great Basin Mine Watch suggest that mounds will cause water to seep to the river. The BLM model should be used to predict the amount to be lost to the river.

19-15 Figure 3-11 provides a good picture of the groundwater levels in the project area, but the figure is missing a date. Based on the references, the contours could be from different time periods. Without a reference date, the figure is relatively useless.

19-16 Table 3-17 provides useful information about the water level information at the site, but it leaves out one piece of information necessary to assess water levels: the elevation at the ground surface. Knowing the total depth, screen interval, and groundwater level is not sufficient if one wants to assess independently the gradients established at different levels because it is not possible to determine the elevation of the screened interval. The table must be updated to include the ground surface elevation.

19-17 The existing conditions section, chapter 3, would be improved substantially with a description of the deficits created in the groundwater by the pit lakes that have and will form in the region and the long-term evaporative loss associated with each. Please provide a list of pit lakes, their depth, volume and surface area, and an estimate of the long-term evaporative loss from each.

19-18 The discussion about the impacts of dewatering in Chapter 4 lacks detail. Figure 4-2, while intended to show the additional drawdown due to Leeville, could provide significantly more information. As presented, the reader does not know whether Leeville causes drawdown that exceeds 100 feet; the reader only knows that Leeville has added 100 feet of drawdown over about 3/4 of township T35N, R50E and about 1/4 of T34N, R50e and several sections of two more townships. It is impossible to estimate the true volume of drawdown cone attributed to Leeville. We recommend that a true contour map of drawdowns attributable to Leeville be provided. The drawdowns would be calculated based on existing conditions attributable to currently approved projects (see the discussion above concerning what the existing conditions are at the project) and to all projects including the Gold Quarry Expansion. A similar discussion applies to Figure 4-3 in that it is more appropriate to show the ten-foot drawdown area that will be caused by the proper existing conditions and the ten-foot drawdown area due to Leeville.

Responses

Response 19-14

Data presented in the Boulder Valley Monitoring Plan reports clearly shows that the southern margin of the groundwater mounding within the alluvial aquifer in Boulder Valley does not approach the Humboldt River. Monitoring wells G-32, G-33, and G-35, all completed in alluvial sediments approximately 5 miles north of the Humboldt River have recorded only seasonal variations of a few feet since monitoring began in 1991, thus, no measurable seepage to the Humboldt River as a result of re-infiltration is anticipated.

The area north of the Humboldt River, from approximately Dunphy to Argenta, is irrigated annually by water from the White House Ditch (which diverts water from the Humboldt River near Dunphy) and Rock Creek. This irrigation practice causes groundwater levels to rise and fall a few feet seasonally. The seepage observed into the Humboldt River may have been the result of irrigation return flow or water released from bank storage after spring runoff.

Response 19-15

As described on the figure, the contours presented on Figure 3-11 provide a "generalized potentiometric surface" of the bedrock aquifers and is designed to give the reader a general understanding of the two major cones of depression that have developed from mining operations on the Carlin Trend. The data are from 1998 and 2001, as listed in the sources on the figure and is a composite of both lower and upper plate aquifers. Also shown on the figure is the groundwater divide in upper plate rocks that is coincident with the Tuscarora Mountains.

Response 19-16

See revised Table 3-17 in **Errata** (Chapter 3 of this Final EIS) for well head elevations.

Response 19-17

Chapter 3 describes the Affected Environment, which is the environment to date. No pit lakes have formed in the Carlin Trend at the present time; therefore, no deficits in groundwater can be attributed to evaporative loss from a pit lake surface.

Response 19-18

The Draft EIS discloses, on page 2-16, that water levels in the lower plate carbonate rocks need to be lowered to the 3800 elevation, 1100 feet lower than the current elevation of 4900 feet. Figure 4-2 discloses the area that dewatering at Leeville would cause additional drawdown beyond what has and will occur as a result of pumping at Gold Quarry, Betze/Post, and Meikle.

An estimate of total volume of water to be removed via the Leeville Project dewatering program is provided on page 4-18 under *Impacts to Surface Water Quantity.* BLM believes that addition of drawdown isopleth contours to Figure 4-2 would not provide an accurate method for determining total volume to be removed from the groundwater resource since, for example, water is still being removed when the cone of depression is at steady state.

Comments

Grouting

19-19 The BLM should analyze the use of grouting for decreasing the amount of needed dewatering. Grouting should be used to decrease the predicted 360,000 af of dewatering water that will be removed to keep the shaft dry. The benefits of doing this will be apparent from considering the marginal effects of the Leeville project. The BLM erred in dismissing the idea of grouting by citing safety concerns. The widespread use of grouting at mines throughout the world on mines with much more head on the grout than would occur at Leeville.

19-20 The DEIS downplays the value of grouting by suggesting that it could "eliminate the need for a pipeline", "reduce the size of the pipeline" or reduce the "capacity of the mine dewatering system" and the "quantity of water needing treatment". The true value of grouting is to eliminate the additional impact on cumulative dewatering caused by the Leeville Project detailed in the previous section.

19-21 To justify their decision not to use grouting to decrease the need for dewatering, Newmont commissioned a study by Page A. Herbert titled Feasibility Study of Grouting as a Means of Subsurface Water Control, Leeville Project, Eureaka County, Nevada. The copy received by Great Basin Mine Watch is undated, but the DEIS references the report as Herbert, 1998. Hereinafter we refer to the report as Herbert. Jim Kuipers (attachment 2) described the report as follows:

> The referenced report was also reviewed and considered together with my knowledge of grouting procedures that have been effectively utilized to control groundwater flow at mines such as the Stillwater and East Boulder projects in Montana and elsewhere. Grouting has been proven to be a technical and cost-effective solution in many cases to groundwater inflow concerns, and is currently widely used at various locations in the hardrock underground mining industry.
>
> Herbert's report is more of an overview with some site-specific consideration of the Leeville Project, and is not a comprehensive or conclusive analysis typically performed for a feasibility study level evaluation (the term pre-feasibility study would be more appropriate for the evaluation performed). However, the report does point out that there are both pros and cons for grouting, and does make the conclusion that *grouting could be considered as a possible method of controlling groundwater on a regional scale where the entire stratigraphic sequence is considered and specific concerns could be addressed.*

The grouting study suggests that the creation of a grout curtain will have deleterious effects on the natural flow and recovery of the drawdown cone . Herbert at 14-15. Although the width of the grout curtain is never discussed, Mr. Herbert claims that "[s]uccessful grouting could effectively place a wall across the valley in the area of the limits of the deposit". Herbert at 14. We envisage a shaft with separate stopes being successfully grouted, not a wall transverse to the northwest-southeast trend of current drawdown. This should not cause a wall that would block flow. But Mr. Herbert does not explain why this is a problem. Because the drawdown cones would reach the grout curtain, Mr. Herbert explains that "[w]ith the dewatered deposit inside the grout curtain this would essentially have the effect of dewatering the entire trend." Id. There is no explanation of how this would occur. "Once mining operations have ceased this could present a serious barrier to natural flow of ground water". Grouting study at 15. With dewatering needs at Leeville exceeding 300,000 af, or more than 15 years of the recharge in the area, it is difficult to see how a grout curtain that eliminates most of the dewatering would have more of an impact. However, just as importantly, Mr. Herbert makes many arm-waving prognostications about the effects on the hydrology when it would be a simple matter to add a grout curtain to the existing Carlin Trend dewatering model actually predict its' effect. Without such an analysis when one is easily obtainable, the BLM cannot rely on this guesswork.

Responses

Response 19-19

BLM did consider the use of grouting as a method to reduce dewatering requirements for the Leeville Project. The large area and great depth from the surface (up to 2,500 feet) that would require grouting, coupled with the high hydraulic conductivity (100 ft/day) and high head (1,100 feet or 343 psi at the lowest workings), renders the concept of grouting the entire underground workings impracticable. Failure of the grout curtain could result in rapid flooding of the underground mine that could result in loss of human life. The human safety factor is a legitimate reason for rejecting a project alternative. See Responses 1-2 and 1-3 for additional discussion on the grouting proposal.

Response 19-20

Comment noted.

Response 19-21

BLM located and contracted Page Herbert to review Newmont's conclusion that regional grouting of the Leeville, Turf and Four Corners ore bodies was not feasible. As referenced by Herbert, Newmont contracted with Phillips Mining Geotechnical & Grouting Inc. of Tucson, Arizona to evaluate the feasibility and technical merits of grouting the West Leeville ore body (Phillips 1997). Also referenced by Herbert, Hydrologic Consultants, Inc. (HCI) conducted a numerical modeling investigation (HCI 1998) to estimate groundwater inflow to the main production shaft and the necessary reduction of hydraulic conductivity by cover grouting to achieve manageable inflows at the bottom of the shaft during shaft sinking.

BLM acknowledges that grouting can be an effective tool to reduce groundwater inflow in a mining environment. However, grouting is not a universal solution and site-specific conditions must be considered. Conditions at the Stillwater and East Boulder mines located in Montana bear little resemblance to the geologic and hydrogeologic setting at Leeville and direct comparisons are not valid. Although both the Stillwater and Leeville mine sites contain deposits hosted in rocks with little or no primary porosity or permeability (original, open-space voids for water storage and interconnection of open spaces for transmissivity), over time these units have developed secondary porosity and permeability that is primarily fracture controlled.

At the Stillwater Mine, the host for the deposit is ultramafic intrusive rock that exhibits variable porosity within the rock sequence. The more porous areas are located along fractured (and locally faulted) zones and porosity of these areas varies depending on the degree of interconnectivity of the fractures (Feltis and Litke 1987). Hydraulic conductivity measured during dewatering tests at the Stillwater Complex is very low; 0.02 feet per day ($7x10^{-6}$ cm/sec) (Weimer 2002). However, occasional zones of high conductivity (persistent high volume flows on the order of several hundreds of gallons per minute) are encountered in discreet fractures or fault zones in underground workings. Given the relative relief from nearby mountainous topography and the depth of the ore, water filled fractures are under considerable hydrostatic head. However, limited interconnectedness and/or limited storage capacity in the fracture systems or faults results in inflows that are sustainable only over short periods of time until the fractures drain down. For these reasons, pressure grouting of discreet fractures is an effective method of stemming flow into underground workings at the Stillwater Mine.

Comments

19-21

It is important to assess Mr. Herbert's conclusions individually. Importantly, Mr. Herbert concludes that "grouting would probably be a viable option" if not considered as a part of the massive dewatering that already exists in the area and at no point documents any real safety concerns with the concept of grouting. Mr. Herbert suggests that the current state of drilling technology renders it impossible to assure the effectiveness of the grout curtain. Herbert at 16. The sentence in which he makes this claim has no references or reviews of other instances in which there was such a difficulty. Why is grouting feasible as described, but near impossible to "obtain with current drilling technology?"

Mr. Herbert also suggests that because the mines have failed to implement grouting as a strategy on a regional scale in the Carlin Trend that it should not be used here. Id. Again, there is no reference or even a simple discussion as to why this is the case. Failing to do it right the first time is no reason for failing to do it right now. Also, to the extent Mr. Herbert suggests that deep grout curtains may have worked on regionwide scale, he agrees with requests made by Great Basin Mine Watch on previous mine projects, such as the Gold Quarry Expansion.

Mr. Herbert then suggests that "grouting as an alternative to dewatering would result in an **unknown degree** of risk to human safety and an **unknown degree** of long-term effectiveness in controlling groundwater inflow..." Id., emphasis added. The salient point here is that he mentions that the risk is unknown and does not attempt to assess the actual values. Then he states, "**[i]n my opinion,** these unknowns would persist regardless of the amount of money expended to construct a grout curtain to encapsulate the deposit." Id., emphasis added. This is another opinion provided without reference, substantiation or explanation.

Mr. Herbert also fails to address grouting at other mines, such as Stillwater in Montana to explain why what is feasible there is not feasible here. It is our understanding that at Stillwater the head is several thousand feet, which is more than would be experienced here. The head is even deeper at South African mines that use grouting.

Based on our understanding of the existing hydrology in the Leeville Area, the grout may not experience the pressure that otherwise would be expected at such depth. The existing drawdown has apparently lowered the water level in the deeper aquifer at faster rate than the overlying aquifer. Herbert recognized this fact. Herbert at 12. Figure 3-13 (in the DEIS) shows that the head in the siltstone (upper plate) is 600 to 800 feet above the water level in the carbonate zone. There appears to be a hydraulic disconnection between the water levels in each zone. In the siltstone, the water level decreases as screening depth becomes deeper. This suggests strongly that there is a vertical gradient, a point made in the DEIS which suggests there is a "vertical downward gradient of about 0.7 foot/foot". DEIS at 3-46. With vertical gradients as high as this, it is likely that little horizontal flow occurs; this vertical gradient reflects a system through which water is recharging the groundwater. It may be that this is an unnatural situation established by the dewatering of the deeper aquifer. Regardless of the source, it is likely that the head on any grout used in the siltstone zone would be only a few hundred feet. At least in this zone, there would be no reason to dewater as proposed on page 2-16. Also, in the carbonate zone, the head on grout around a shaft may be only several hundred feet as it appears from figure 3-13 that the head in the siltstone zone would not affect the head in the lower zone.

We envisage use of grout as follows. There would be no problems of placing grout with 2000 feet of drilling as discussed by Mr. Herbert. As the excavation of the shaft reaches water, Newmont would pressure grout in advance of additional excavation. This could proceed simply and would require drilling (at a small angle) just hundreds of feet at a time. Pressure grouting would force grout into all relevant fractures and connected pore spaces. By relevant, we mean that fractures and pores that do not get grout are likely not connected or are connected by such low primary permeability that the amount of flow would be insignificant. Flow in fractures varies exponentially with the effective diameter of the pathways. If the grouting just fills the largest fractures, it will block most of the flow. Drainage pathways constructed in the casing along the shaft would surely be able to capture flow that may emanate from these small fracture. Because of their size, it is unlikely that small fractures would be significant sources for long time period because the drainage system would likely drain quickly.

Responses

At the Leeville Project, the host rocks are sedimentary. Two zones of varying hydraulic conductivity have been identified in the Leeville Project area. One zone is the upper siltstone (Upper Plate) that exhibits relatively low hydraulic conductivity (approximately 2 feet per day). The second zone (Lower Plate) is a limestone formation that hosts the ore deposit and exhibits higher hydraulic conductivity (approximately 100 feet per day). The hydraulic conductivity of this zone is largely secondary and results from a pervasive, well-interconnected fracture system whose transmissivity has been enhanced by dissolution of limestone along the fractures. Dissolution has locally been extensive enough to develop large underground caverns (reservoirs) that are connected to the regional fracture system. Hydraulic conductivity in the carbonate rock matrix is very low, commonly less than 0.03 feet per day. These factors result in a hydrostratigraphic unit that has a high transmissivity.

Direct comparison of the effectiveness of pressure grouting in controlling mine inflow between the Stillwater Mine and the proposed Leeville Project is not a comparison based on similar settings and characteristics. The rock units are different (intrusive vs. sedimentary), and fracture density, fracture interconnectivity, and hydraulic conductivity are distinctly different for the two deposits.

HCI (1998) concluded that successful cover grouting of the production shaft at the Leeville Project would require 1000-fold reduction in hydraulic conductivity in the lower plate (carbonate) rocks and a 10-fold decrease in upper plate (siltstone) in order to reduce residual inflow to manageable rates (less than 30 gallons per minute (gpm)) during shaft sinking. Inflow into the production shaft, with as little as 200 feet of head (in the carbonate), could be as great as 7,500 gpm without grouting. With flow as low as 30 gpm, erosion and raveling of the ground around the production shaft could result in catastrophic failure of the grout curtain, rapid flooding of the shaft, and loss of human life.

Grouting of the entire mining area, that is the Leeville, Turf and Four Corners ore bodies only exacerbates the problems posed by grouting only the production shaft area. Even with a 1000-fold reduction in hydraulic conductivity surrounding the entire mining area (see Response 1-2), residual inflows would be quite high. This flow would result in areas of raveling and erosion, which would cause areas of premature failure. This premature failure would result in large inflows of water into the mine that could result in serious injury of loss of life.

Current drilling and grouting technologies are inadequate to achieve the necessary reduction in hydraulic conductivity to assure safe underground mining conditions. Phillips (1997) estimated that grout holes, drilled from the surface, would have to be placed on 15-foot centers over and around the entire mining area. Approximately 10,000 holes would have to be drilled to depths of 1,200 to 1,900 feet and placed precisely where needed to assure a continuous grout curtain. Significant hole deviation would occur (as was experienced during the exploration and development drilling of the deposits) which would require wedging, directional drilling, or deviation corrections to achieve the required drilling accuracy. Each hole would require proper development to remove drill cuttings and drilling fluids to allow proper access by the grouting material to fractures encountered by the drill holes. Insufficient hole development would lead to improper placement of the grout, which would result in gaps in the curtain, which would subsequently result in inflow into the mine and catastrophic failure.

Comments

19-21 We acknowledge that in the carbonate rock there will be large pore spaces and fractures that cannot be grouted. During a tour of the Mickle Mine, we observed such pore spaces that had been filled with water even though the water table had lowered below the level of the pore. It is likely that these "caverns" required millenia to erode or dissolve the rock. If the caverns are connected to the general groundwater system, it is likely that the connection is through very small fractures. Once the caverns drain, it is likely that flow to replace the water in the caverns will be very small. It is also important to note that the caverns will not be drained by general aquifer dewatering methods because of the small fractures or pathways that connect the caverns to the rest of the groundwater system. Even with general aquifer dewatering, water will remain in the large pore spaces and will still be encountered during shaft excavation.

19-22 If grouting is infeasible, why is it one of the mitigation measures? One of the proposed action mitigation measures is to grout shaft walls "to prevent inflow of groundwater". DEIS at 2-45. If this will occur after the aquifers have been dewatered, this seems to prevent seepage only of localized water. What value is grouting if it will not decrease the amount of dewatering? It is not mitigation; it merely facilitates the construction. Also, why is grouting to be used to stop localized seepage if grouting is infeasible? "The concrete shaft liner installed in each shaft would be designed to prevent seepage into the shafts." DEIS at 2-15. "Should groundwater inflow to shafts occur during construction in volumes that impeded shaft sinking activity, pressure grouting techniques would be used in the upper plate rocks to seal fractures and reduce inflow. This technique may be used if excessive groundwater inflows are encountered during underground development and mining." DEIS at 2-19. Our description of how grouting should proceed with the excavation of the shaft would be similar grouting to what is proposed herein.

Surface Water

19-23 The DEIS discusses existing water quality and flows on various streams near the project. However, it leaves off two streams that should be analyzed. These are Simon Creek and Lynn Creek. Both are tributaries to Maggie Creek and have perennial stream segments. See Figure 3-6. Both of these streams are close to the Leeville Project and could be affected by the project. In the discussion of water quality in chapter 3, the FEIS should mention the fact that Simon Creek has elevated arsenic concentrations. For more information on this, please see the letter that Great Basin Mine Watch submitted to the Nevada Division of Environmental Protection concerning the state's impaired waters list, or 303d list. The letter is posted at www.greatbasinminewatch.org. The data used to recommend this stream as impaired was derived from Newmont's Maggie Creek monitoring reports.

Potentially Acid Generating Waste Rock

19-24 The description of handling potentially acid generating (PAG) waste rock is completely insufficient. DEIS at 2-20, 2-23. The DEIS states that "[d]ue to the nature of underground mining, segregation of PAG waste rock is not usually possible". DEIS at 2-20. Please explain what is meant by segregation if the description of encapsulation in the next paragraph is not segregation. Also, please explain why it is not possible "due to the nature of underground mining".

There is a plan to encapsulate any PAG waste rock. However, the plan is insufficient because it does not provide design standards for permeability or compaction. Considering that the base is "constructed of compacted, low permeability materials, designed to prevent vertical migration of fluids" and that is would "consist of mine waste rock and subsoil excavated from shaft sites", it is essential that design parameters be specified and a test program initiated so that the public can trust that waste rock will truly be isolate from the environment. Additionally, quoting from Kuipers (attachment 2)

Responses

Grouting from underground has similar, yet different obstacles to success in areas of high hydraulic conductivity. To achieve 100 feet of advance of a drift, approximately 20 holes would be drilled 160 feet ahead of the workings. The holes would require uniform spacing to avoid leaving ungrouted "windows" in the curtain. Numerous grouting drifts would have to be driven above, below, and along sides of the ore bodies. Overlapping covers would be drilled and grouted to achieve the 1000-fold reduction in hydraulic conductivity of the entire area that is required to reduce residual inflow to a manageable rate. Again, residual inflow would result in areas of raveling and erosion, which would cause areas of premature failure in the grout curtain. This premature failure would result in large inflows of water into the mine that could result in serious injury or loss of life.

Grouting of upper plate siltstone rocks is planned (see Response 1-2). As pointed out in the comment letter, upper plate rocks have a vertical gradient of 0.7 foot/foot, which is a naturally occurring feature. The presence of a vertical gradient does not preclude horizontal flow within the upper plate rocks. During shaft sinking, dewatering coupled with grouting of fracture zones would provide a safe, efficient work environment. Dewatering would be discontinued in upper plate rocks after all shafts are successfully completed.

Caverns, such as the reviewer observed at the nearby Miekle Mine, are connected to the 'regional' groundwater system. The fact that the cavern was drained, is proof of interconnection to the regional groundwater system to the cavern and the dewatering system designed to lower groundwater in the carbonates. Large caverns would be impossible to grout and would create a large gap in the grout curtain.

Also see Responses 1-2 and 1-3.

Response 19-22

Grouting of lower plate carbonate rocks is considered infeasible. In upper plate rocks (primarily siltstone), grouting would be used in areas of groundwater inflow not intercepted by the localized upper plate dewatering system.

Also see Responses 1-2 and 19-21.

Response 19-23

Simon and Lynn creeks are located outside of the hydrographic basin predicted to be affected by the proposed Leeville Project. The source of perennial flow in Simon and Lynn creeks is located above 6,000 feet elevation and would, therefore, not be affected by dewatering associated with the Leeville Project.

Response 19-24

See Responses 18-4, 1-7, 1-8, 1-9, and 1-10. See also the Leeville Project Mitigation Plan in **Appendix A** of this Final EIS.

Comments

19-24

[The plan] relies on the hypothesis that if potentially acid-producing rock is placed with non-acid producing rock acid any acid drainage will be neutralized. However, experience has shown at other hardrock mining sites administered by the Bureau of Land Management and other federal agencies and state agencies, such as the Golden Sunlight Mine and Zortman and Landusky Mines in Montana that neutralization in many cases does not occur as predicted and acid drainage ensues. Experience has shown that general guidelines such as 3:1 acid base accounting (ABA) ratios, placement with non-acid producing rock, and other measures are insufficient to either predict or mitigate acid drainage. The evidence to date would suggest that some rock types in practice can produce acid drainage at even higher ABA ratios than 3:1, in many cases the location specific generation of acid exceeds the available contact area of any surrounding neutralizing materials, and in order to utilize the available neutralizing potential near perfect blending or mixing would have to occur, which is infeasible in most mining operations and at run-of-mine particle sizes. Therefore, the only scientifically supportable hypothesis is that the combination of potentially acid-producing rock may result in a net acid-producing facility.

Presumably, this encapsulation will occur within the proposed waste rock dump. Because it is likely that PAG waste rock will be removed from the shaft intermittently, it will be necessary to either create many encapsulations within the waste rock dump or to segregate the waste rock to minimize the number of encapsulations. Please discuss this more.

The base will consist of mine waste rock and be "sloped to allow drainage to a collection point" that will be "periodically inspected by Newmont personnel" with excess water trucked away. DEIS at 2-20. Presumably, the base will be covered with PAG waste rock. How will water be collected at the discharge point? The problem with these plans is that it provides a point discharge for the drainage of meteoric water into the future. The description is that the "water draining to the collection point is lost to evaporation". DEIS at 2-20. What is the basis of this statement? Does it run onto the ground and then evaporate or is it collected so that it evaporates from a pond?

The preferred method for encapsulating PAG waste rock would be to isolate it from the system. Newmont's proposed measures rely on the used of compacted locally available materials, to prevent vertical migration. While it may be possible to reduce vertical migration with such measures, a more typical engineering designed cover is necessary if the objective is to eliminate or prevent vertical migration. Compacted clay or alluvium planted with appropriate vegetation is commonly used as a part of engineered design covers. However, those materials by themselves exhibit properties that cannot ensure that they alone will prevent fluid migration. Factors such as material homogeneity, consistency, placement and compaction lead to inconsistencies in its effectiveness, and it can be disrupted by disturbances such as compaction and settling. The materials on top of the pile will be subject to freeze/thaw cycling which can lead to desiccation and cracking of the layer. The use of compacted clay or alluvial materials in the prevention of fluid infiltration and capture of acid drainage should be reconsidered to eliminate or prevent infiltration or to affect capture of solutions. The use of engineered covers employing water balance or water barrier principles should be considered as an alternative to the approach used in Newmont's plans. The performance criteria (% of precipitation intended to infiltrate, or percent of drainage intended to be captured) should be specified in the plans.

19-25

to state that the majority of the waste is non-PAG. DEIS at 3-11. Actually 35% of the total samples (based on n) have a NPR less than 3.0. An additional 27% have NPR values just above 3.0. So, rather than saying that just one of the waste rocks is PAG, it would be more accurate to indicate the percentages just discussed.

19-26

The discussion of the Net Carbonate Value (NCV) test shows a bias toward the project and toward downplaying the impacts. "Results of the NCV tests indicate that of 966 samples analyzed, 61 percent are in the range of neutral to highly basic, with the greatest population occurring in the highly basic category. The remaining 39 percent of samples are in the range of slightly acidic to highly acidic, although **only** a small portion fall in the highly acidic category." DEIS at 3-11, emphasis added. The use of "only" to describe the portion in the highly acidic category illustrates a bias.

Responses

Response 19-24

See Responses 18-4, 1-7, 1-8, 1-9, and 1-10. See also the Leeville Project Mitigation Plan in **Appendix A** of this Final EIS.

Response 19-25

The relative percentage of waste rock described as potentially acid generating (PAG) is based on the tonnage of material within rock type, not on the number of samples used to characterize each rock type. The sampling upon which this statement is based was conducted on a lithology specific basis. This is because material would be handled operationally on a lithologic, not a sample, basis. It is important to note that sampling frequency varied between lithologic units, because the level of sampling was driven by the variation in mineralization observed within each unit. To describe the relative percentage of PAG based on sampling frequency would be inaccurate. Approximately 11.4 percent (454,000 tons) of waste rock is predicted to be PAG.

Response 19-26

Comment noted. Use of the word "only" was not intended to reflect any bias, and its deletion does not change the conclusion of the sentence in question.

Comments

19-27 Table 4-4 is not adequate. It appears to be a weighted average of MWMP results from Table 3-6 weighted by the tonnage estimates in Table 4-3. Please provide an improved description in the FEIS. However, the summary of seepage from waste rock dumps as weighted averages in Table 4-4 is not an appropriate means of presenting the data. The dumps will not be perfectly blended and probably none of the infiltrating meteoric water will leach according to the weighted average. Also, it's not likely that the water at the collection point beneath the waste rock will be an average of flow from the entire waste rock dump. Rather the water will leach through sections of the waste rock dump preferentially and resulting outflow will resemble that pathway. If the PAG rock is adequately separated, it would be possible that outflow will have a better quality than that presented in table 4-4.

19-28 The DEIS states that "most mined out stopes would be backfilled with cemented rock fill" and that the "backfill would consist of neutral or acid-neutralizing material from existing open pit operations in the area of Project waste rock" DEIS at 4-9. This does not make sense. If the backfill is to be cemented, then water cannot seep through it. It makes sense to dispose of net acid producing rock by backfilling the stopes with it.

19-29 We suggest that alternative b is preferable because it requires Newmont to backfill the shaft. While it would not use all of the 4 million ton, 57 acre ton waste rock dump, it would reduce its side. We recommend that it be used to isolate the PAG rock. It should be slurried to prevent seepage and continuing leaching of contaminants and to effectively isolate the PAG material. If the shaft is not backfilled, there is a potential for air to mix with the rock that remains in place for oxidation to occur. While backfill is clearly the environmentally preferable means of waste rock disposal, it is also essential that Newmont analyze the potential for leaching acid from the shafts for both the backfilled and unbackfilled conditions.

Tailings

19-30 The DEIS has almost no discussion about the tailings other that to state that existing facilities at the South Operations Area can handle the additional volume. Because this tailings facility will be used, the BLM should do a detailed analysis of the conditions at that tailings facility. This is important because some of the spent ore to be deposited in the tailings facility had screamingly high values of contaminants on the standard leaching tests. This is particularly true of the Four Corners Ore, sample #112947. The MWMP test had a pH of 2.98 with arsenic concentrations far **above the standard for hazardous waste** at 30.2 mg/l. If there is leakage in the tailings, or if there are other problems with the impoundment, this extremely hazardous level of arsenic could be released into the environment.

Responses

Response 19-27

BLM recognizes that waste rock would not be completely blended and that any given point beneath a waste rock dump could have a concentration that is higher, or lower, than the weighted average, depending upon the lithology that is dominant along the leachate flow path. BLM further recognizes that flow may be preferential, thus amplifying the contribution of some lithologies over those of others. In a forward-looking predictive model, it is not necessary to attempt to model such complexity. At a site-wide scale, the weighted average of meteoric water mobility procedure (MWMP) test results is appropriate.

Separation of PAG rock could reduce constituent concentrations to levels below those predicted using the weighted average of MWMP results. Newmont has conservatively designed the waste rock disposal facility to reduce infiltration and capture seepage by placing the dump on a low permeability pad and constructing an appropriate cover at closure. Because any seepage will be contained and report to a single collection point, the weighted average MWMP result is adequate for assessment.

Response 19-28

Waste rock that would be excavated during development and mining of the Leeville Project (including potentially acid producing rock) is not of sufficient strength or quality for use in cemented backfill operations (Pettit 2002). The strength and quality of aggregate are necessary characteristics for a competent, long-lasting cemented backfill that would meet structural requirements for ground control in areas to be backfilled. Newmont would use waste rock produced from Leeville operations as backfill where appropriate opportunities exist (i.e., where structural ground control is not critical). See also Response 1-7.

Response 19-29

Shaft backfill (Alternative B) has been selected by BLM. See Response 4-5.

Response 19-30

Constructed capacity of the 5/6 tailing facility is 93 million cubic yards; the permitted capacity is 139 million cubic yards. At the end of 2001, 67 million cubic yards of tailing had been placed in the facility. As a result of SOAPA, Newmont anticipates placing an additional 13.9 million cubic yards of tailing in the facility. Leeville would generate an additional 16.7 million cubic yards. Additional permitted capacity will be constructed to accommodate the planned placement of tailing in the facility.

The BLM completed an Environmental Assessment of Newmont's Plan of Operations for construction of Tailings Facility 5/6 (then known as 2/5) in April 1991. The purpose of that environmental assessment was to identify changes and effects in each resource discipline for the proposed and related actions and reasonably foreseeable actions. Disciplines analyzed for both direct and cumulative effects include Geology, Water Resources, Soils, Air Quality, Meteorology, Climatology, Noise, Vegetation and Wetlands, Wildlife, Aquatic Resources and Fisheries, Land Use, Recreation and Wilderness, Visual Resources, Paleontology, and Socioeconomics.

Design features incorporated into the tailings facility to protect Waters of the United States (WUS) include: 1) basin liner and underdrain collection system; 2) stability monitoring consisting of piezometers to monitor hydrostatic head on the basin liner and within the

Comments

Cumulative Impacts

Mining in the Carlin Trend has caused significant cumulative impacts to the region. Overall this may be the most important aspect of the project. During the SOAPA DEIS review, we commented extensively on the Cumulative Impacts Report (CIR) that was prepared for that document. The CIR is also referenced for cumulative impacts in the Leeville DEIS. DEIS at 4-30. We repeat some of those comments here with some editing.

19-31 **Boundaries of the Analysis**: The hydrogeologic boundaries considered for the analysis limit the impacts to the south. Section C-C' (Figure 2-3, CIR at 2-4) shows typical flow patterns for alluvium underlain by bedrock: in the alluvium, the flow is from high points to low points while in the bedrock, flow is in one direction. Here, flow continues south in the Carbonate aquifer; setting the boundary at the Humboldt River ignores this boundary.

19-32 Also, the report appears to ignore pumping for the Meikle Mine. The discussion indicates that the groundwater level will be maintained at 3600 feet until 2010 "in the area of the Betze-Post Pit and Meikle Mine". CIR at 1-8. We understand that Meikle will require maintenance pumping until at least 2018. While some, if not all, of its current dewatering needs are met by Goldstrike, its longer life will require additional pumping. The cumulative impact report is faulty if it does not include this additional analysis. The Leeville DEIS continues this error. See the discussion above and Figure 3-7, DEIS at 3-27.

19-33 **Monitoring Programs**: Annual monitoring of springs is insufficient for various reasons. First, it will require a minimum of four years to detect a statistically significant trend. And that would occur only if there was a decrease or increase in flow or contaminant concentration each year.

For the Gold Quarry Mine, there is a commitment to monitor water resources "after cessation of mining activities in the South Operations area." CIR at 1-12. What will be the source of funds for this? Unlike discussed in the section for Barrick, there are no established trust funds. The new BLM 3809 regulations require a trust fund be established for long-term mitigation of impacts; Newmont must do this as a part of both the Leeville and Gold Quarry projects.

Responses

embankments, and a network of fixed survey points for measuring the three-dimensional settlement of all embankments; 3) diversion channel designed to handle a 100-year, 24-hour storm event; 4) downstream cutoff trenches that will collect any fluid that might seep from the base of the dam or leak from the reclaim pipeline or underdrain collection ponds; and 5) sufficient capacity in the impoundment in the event of power failure that would prevent water from being released. BLM issued a Finding of No Significant Impact (FONSI) and plan approval and construction of the initial phase of the facility was completed.

The SOAP EIS (BLM 1993b) describes expansion of the tailing storage facility and ongoing ore processing operations for the Gold Quarry Mine and South Operations Area. Expansion of the 5/6 Tailings Facility was accomplished by raising the height of the existing embankment from 100 feet to 250 feet. No additional land disturbance was required for this expansion as the original design provided for this and subsequent expansions. Production of refractory ore from the North Operations Area is also described in the document. The tailing storage facility in the South Operations Area is designed to contain tailing material and to control leakage. Permits issued by the State of Nevada that govern design and operation of the tailings facility are the Nevada Division of Water Resources Dam Permit J-346 and Water Pollution Control Permit NEV-90056 which is regulated by the Bureau of Mining Regulation and Reclamation, a division of the Nevada Devision of Environmental Protection. These permits allow for increasing the height of the tailing facility to 302 feet.

In 1995, BLM completed an Environmental Assessment for expansion of the 5/6 Tailings Storage Facility. A Finding of No Significant Impact was made and approval for expansion of the facility to a height of 320 feet and a capacity of 139 million cubic yards was signed on March 13, 1995.

Response 19-31

Deep interbasin flow through the carbonate aquifer north of the Humboldt River is a controversial topic, even among experts at the U.S. Geological Survey. The model report (page 22) cites two literature references that support the model assumption of no groundwater inflow from areas beyond the hydrologic study area. Furthermore, field data demonstrate the compartmentalization, or discontinuity, of groundwater flow in the carbonate aquifer within the hydrologic study area. The conceptual model for the hydrologic study area that was chosen for the numerical model excludes any potential natural groundwater inflow from the carbonate aquifer beyond the model boundaries.

Response 19-32

Figure 3-7 of the Leeville Project Draft EIS shows predicted pumping for both Betze/Post and Meikle mines. The drawdown achieved by the Betze/Post dewatering system has also dewatered Meikle. The projected time of dewatering is based on BLM's understanding of the life of the Meikle Mine. The pumping rates and duration were included in the CIA.

Response 19-33

Annual monitoring of springs is performed in the fall, during base flow conditions, because data collected during spring are influenced by runoff and input from colluvial aquifers, both of which are not connected with the regional groundwater system. Establishment of funding mechanisms to address future monitoring and/or remediation projects will be identified in the respective Records of Decision for the Projects.

Comments

19-34 **Sinkhole Development**: The approach used by the BLM in assessing sinkhole development is generally adequate, however, the science of predicting sinkholes is in its infancy. With aquifer depletion around the world, it is an impact which will likely require much more research. In addition to the total depth of drawdown and thickness and type of overburden, the BLM should consider the rate of drawdown and the rate of recovery. If sinkholes depend on drawdown through a the top of the carbonate layer, it is irrelevant whether the total drawdown reaches 1000 feet below the surface. Rapid flow will dissolve more fluid pathways and caverns than slow flow. The BLM should add a factor of rate of head change which could be a change in water level per year.

The BLM should provide a map of depth to the carbonate rock. In determining the areas susceptible to sinkhole development, the BLM considers the drawdown and the depth of carbonate rock. CIR at 2-15. Drawdown maps are provided; maps of the depth are not provided.

19-35 **Springs**: The description of spring locations and data is useful, although it downplays the potential impacts by emphasizing that the flows are quite small. CIR at 3-14-17. In the desert, these flows are very important. The data is not presented in such a way that it is possible to assess the impact that may occur.

19-36 **Impacts to Regional Water Balance**: One of the best ways to consider the impacts of dewatering and pit lake creation is to consider the water balance. The CIR compares the water balance as fluxes in 1998, 2011, 2061 and 2111. CIR at 3-67-71. Unfortunately, the chosen years and method of comparison truly downplays the potential impacts.

The chosen years essentially ignore the huge seepage amounts into the pit lakes. Tables 3-18 and 19 show pit lake seepage fluxes from 2200 to 3700 for the two pit lakes to be formed. The dates, 2061 and 2111 are long after the lakes will be substantially full[1]. The Betze-Post pit lake will contain about 570,000 acre-feet of water. Between 2011 and 2061, when the model shows that only 3500 af/y will enter the lake (CIR at 3-68), up to 570 kaf will have entered the lake. For example, if the lake is at 500,000 af in 2061 (88% full), the average seepage to the lake will have been 10,000 af/y. This ignores the fact that early during the refill, the rate will probably be much higher than 10,000 af/y.

19-37 The document should discuss the impact of long-term pit lake evaporation. The post-recovery rates shown in the tables are due to evaporation from the pit lake surface. The most telling factors not discussed are that Betze-Post will evaporate 2900/11200 or 26% of the long-term recharge. The similar rate reported for Gold Quarry is 9%. **These losses will occur to the basin forever.**

19-38 Table 3-18 shows that very high amounts of irrigation recharge and injection occur in the Boulder Flat basin. CIR at 3-68. This recharge is from the irrigation of dewatering water. It appears to partially offset the extreme amounts of Barrick's dewatering pumpage. However, the recharge is downstream of the deficit and will have little effect in recovering the deficit and filling the pit lake. In Boulder Flat, the irrigation occurs downstream from the pit and drawdown cone caused by the dewatering. Figure 3-13 shows this unequivocally. The mounds created in Boulder Flat are south and west of the Post Fault and will never flow toward the mine even with the gradient across the fault. Also, increased ET due to the new wetland areas, including open water surfaces, is not addressed. CIR at 4-11. That there is so much new wetland formed due to the mounding of irrigated with dewatering water indicates that most available storage is full and that much of the future recharge will be evapotranspired. This additional ET should also be discussed in the DEIS. Also, as discussed above, there is no discussion of whether there is even a hydraulic linkage between the alluvial aquifer and the deep bedrock.

Responses

Response 19-34

Sinkholes generally form in pre-existing cavities. A rapid rate of dissolution due to rapid drawdown would not be significant on the time-scale of this Project. Areas where limestone depths are greater than 250 feet were considered safe from sinkhole development, therefore additional detail on the depth of carbonate is not necessary.

Response 19-35

The potential impacts to springs are disclosed appropriately starting on page 3-51 of the CIA. Also see page 5-17 of the CIA for impacts on wildlife from dewatering.

Response 19-36

The years chosen for discussion in the CIA illustrate a representative range of years for the analysis and were not selected to ignore any particular period. The following years were chosen for the water balance: the year for EIS analysis (1998); the last year of mining (2011) at Betze/Post, Meikle, and Gold Quarry; and 50 and 100 years after the end of mining (2061 and 2111). Potential impacts are greatest when groundwater removal is highest. Removal can be greatest from pit lake seepage or pumping there is no difference in effect on the basin budget, whether the water is removed by pumping or by flowing into the pit. In 1998, Barrick pumped 100,300 acre-feet. This amount meets or exceeds maximum inflow rates into the pit after mining ends. Thus, the maximum potential impact on the regional water balance can be estimated from the 1998 impacts. This is also true for the Gold Quarry pit and the water budget for Maggie Creek basin.

More detailed information on the modeling is available in the Barrick hydrologic modeling reports (Radian 1997a, 1997b).

Response 19-37

Comment noted. The pit lake evaporation numbers are factored into the pit lake seepage value in Tables 3-18 and 3-19 in the CIA. The pit lake seepage values reflect groundwater inflow required to counter pit lake evaporation at steady state. See page 3-71 of the CIA.

Response 19-38

Irrigation occurs in the Boulder Flat Basin where there is a need and use for irrigation water. If the intention were to irrigate upstream of the drawdown cone, irrigation would occur on relatively steep hillsides, not amenable to irrigation. See Response 19-13.

The mound in Maggie Creek Basin is in the Carlin Formation, whereas water is withdrawn from the lower carbonate aquifer. The mound is caused by water infiltrating from Maggie Creek and Maggie Creek Reservoir. Infiltration is a consequence of water storage in the reservoir and water discharge in Maggie Creek, but is not the actual goal of either action.

In 2001, HCI re-modeled the potential for injection in the Maggie Creek Basin using the recalibrated groundwater model approved by BLM. Modeling showed greater recycling of groundwater into the Gold Quarry pit than was modeled for the 1993 SOAP EIS (BLM 1993b). As a result, injection as an alternative was again rejected.

Comments

19-38 A similar issue occurs in the Maggie Creek basin; much of the mound caused by infiltrating water from Maggie Creek occurs southeast of the deficit. The mound also occurs in a different aquifer, the Carlin formation (a point not sufficiently discussed in the document). Being in a different aquifer, the deficit will continue to draw flow from upstream in the regional carbonate aquifer.

19-39 The document should provide long-term water budget amounts broken out in several periods. We suggest that the BLM use the present through 2011, 2011 to 2061, and 2061 to 2111. Rather than an instantaneous rate from the groundwater model, a cumulative volume would provide the public with a more accurate presentation of the created deficit. Table 5 is insufficient because it merely provides the steady state values with no comparison of independently measured or estimated conditions.

19-40 There should be an explanation for why the 2111 pit lake seepage into Betze-Post exceeds the 2061 seepage. Assuming that the pit is fuller in 2111, the gradient should be less than in 2061 leading to a lower seepage rate. In fact, it should be approaching the post-recovery level at this point. Does this represent an error in the modeling or round-off error in the reporting? The reason could also be that more of the water is coming from a more conductive zone.

19-41 The other problem is that in 1998 for mining conditions, there is a 20,500 af/y flux to surface water streams under "other" while the without mining conditions are only 6900 af/y. CIR at 3-68. The amount in 2011 is only 4600 af/y. If this is due to mounding causing discharge to surface streams, it should still be occurring in 2011. This requires some explanation. Also, this discharge to surface streams is directly linked to the recharge of dewatering water. The amount being lost in this way decreases the supposed benefit from all of the recharge.

19-42 It is also important to mention that the mounding has caused significant increases in ET from natural vegetation. In the Boulder Flat, about 4000 af/y are lost to ET due to the increased groundwater levels.

19-43 The bottom line in the tables show the amount of water removed from the basin due to pumpage. It is the difference between inflow and outflow. Compared to premining conditions, it primarily represents changes in flux caused by imposing the pumping stress on the system. However, it ignores the creation of a 570,000 af pit lake at Betze-Post and a 170,000 af pit lake at Gold Quarry. These pit lakes are essentially an increase in the total water storage in the basin. However, because of the steep gradient toward the pits, this storage must (will) be filled as soon as possible after dewatering ceases. It represents a deficit on the basin that the BLM appears to have ignored.

19-44 The category, subsurface inflow, reveals the impact that dewatering may have on adjoining basins. Subsurface inflow increases as the water level in the basin decreases which increases the gradient from adjoining basins into the studied basin. These increases which are as much as double in the Maggie Creek basin show how dewatering impacts affect basins beyond those affected directly by dewatering.

Responses

Infiltration of excess water into the shallow alluvial system in Maggie Creek Basin was also eliminated from detailed study in 1993. The alluvium in Maggie Creek Basin has limited capacity for infiltration due to low permeability of the alluvium and a high water table. Limited infiltration of mine water has occurred at Maggie Creek Ranch Reservoir (1993 Draft EIS; page 2-60), further reducing the capacity of alluvium to store excess water.

Response 19-39

BLM believes that the CIA provides an adequate analysis for evaluation of cumulative impacts. It is not clear which Table 5 is referred to in the comment. Tables 3-18 and 3-19 give annual budgets.

Response 19-40

The pit lake seepage values in Tables 3-18 to 3-20 of the CIA represent flow from the groundwater system into the pit lake to counter pit lake evaporation at steady state. The pit lake water balance for 2061 includes an inflow of 3,500 acre-feet, precipitation of 500 acre-feet, and evaporation of 1,400 acre-feet (Radian 1997a, 1997b). Table 1-1 in the CIA shows that evaporation is the primary element of flux out of the Betze/Post pit. The seepage value difference between 2061 and 2111 reflects increased seepage due to the pit lake contacting the carbonate aquifer, increasing conductance and the increased evaporative pumping caused by the larger area of the pit lake. These factors outweigh the effect of decreased hydraulic gradient in the system (personal communication between J. Frank of HydroGeo and J. Zhan of Barrick, September 24, 2001).

Response 19-41

The stream-river discharge of 20,500 acre-feet in 1998 is related to the increased discharge to streams (especially from Sand Dune, Knob, and Green springs) due to infiltration from ponds and reservoirs and to a lesser extent infiltration from irrigation. Infiltration of dewatering water and irrigation will end in 2018, and thus the increased outflow to springs.

Response 19-42

Comment noted. This loss is not permanent, as shown in Table 3-18 of the CIA. In the post-recovery period, evapotranspiration will be reduced by approximately 4,000 acre-feet per year, offsetting the increased evapotranspiration during groundwater mounding.

Response 19-43

Tables 3-18 and 3-19 in the CIA show the amounts of groundwater removed from the basin for 1998 and 2011 (during mining activities) as the change in groundwater storage. Similarly, the increase in total storage for groundwater in the basin is shown for 2061 and 2111. Water in the pit lakes is not included as an increase in groundwater storage in the basin, since it is considered surface water. Flow into pit lakes is shown as seepage for 2061 and 2111, and is considered water removed from groundwater storage in the basin. See also Response 19-36.

Response 19-44

Potential impacts to surface resources within the study area are evaluated in the CIA. Subsurface inflow within Maggie Creek Basin is expected to return to pre-mining conditions by 2111.

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[1] Pit lakes will never fill to the premining groundwater levels because evaporation from the open pit water surface will cause the pit lake to continue to act like a large well.

Comments

19-45 **Changes in Flows in the Humboldt River:** Changing flows in the Humboldt River after mining ceases due to refill of deficits created by dewatering has long been an issue to *Great Basin Mine Watch*. The basinwide deficit **must** be made up from somewhere. The source of the water determines the extent of environmental impacts in the future after mining ceases. The great uncertainty surrounding the source of the water remains a major issue herein.

The CIR suggests that the maximum decrease in flow at three gages is only 8 cfs. Over 50 years, that is less than 300,000 acre-feet. The deficit created in just the Carlin Trend is about 2,700,000 af; the deficit created near Lone Tree is near 1,000,000 af. This 8.1% seems to be a very small percentage of the total deficit.

19-46 Except for what it represents to the future water balance in the basin, increased flows during dewatering are not a large concern. This represents a benefit to the ranching community in the basin. Extra water flowing in the river is, however, water that is not stored in the basin to fill the huge drawdown cones and pit lakes being created. Contaminants in the extra water that reaches the sink is a concern addressed below.

19-47 The section ignores seepage to the river. The high mounding caused by irrigation in both the lower end of Maggie Creek and Boulder Flat likely cause a temporary seepage to the river. This is another loss to the basin of the dewatering water. Seepage into the Humboldt River caused by recharging through irrigation or from seepage in the TS Ranch reservoir would be an unauthorized discharge. Congress "did mean to limit discharges of pollutants that could affect surface waters of the United States." McClellan Ecological Seepage v. Weinberger, 707 F. Supp. 1182, 1196. In its ruling, the Court allowed the appellants to "establish (through discovery) that the groundwater is naturally connected to surface waters that constitute navigable waters under the Clean Water Act." Id. Eye witnesses have reported to *Great Basin Mine Watch* that seepage from the river banks on the north side of the Humboldt in Boulder Flat is currently occurring. It appears that McClelland is relevant to this situation and that the BLM must require Barrick to obtain a NPDES permit for this discharge. The existing NPDES permit for Barrick allows for surface discharge at various points but does not include seepage. Because of the potential for the seepage to leach salts, selenium and other contaminants, there should be extensive water quality monitoring occurring in the Humboldt River. Monitoring should also occur to document the existence and amount of seepage. Allowing this discharge without a NPDES permit subjects the discharger to suit under the citizen suit provisions of the Clean Water Act.

19-48 **Impacts to Humboldt River surface water rights:** The discussion minimizes the potential impact by discussing decreases as an annual average and not as an impact during the late summer when irrigation demands are at their maximum and supplies are at their minimum. CIR at 3-87. It would be interesting and useful in this section to discuss the proportion of water rights in the two decrees (for rights above Rye Patch). During late July and August, what proportion of the water rights are usually served? During wet, normal and dry years? How will a decrease of 8 cfs affect this proportion?

19-49 Because Newmont can allegedly replace all affected water rights, the document should specify the quantity and location of Newmont's rights. They should also discuss the loss rates to be applied to these rights. If the affected water rights owner is downstream of the point that water is lost from the river, the replacement water will suffer a loss. This loss rate should be specified in the document. Is there an arrangement with the appropriate governing authority (the Water Master or State Engineer) to implement this swap? Newmont should put up a bond to assure the proper transfer will occur if they are no longer onsite. How will rights holders be accommodated if Newmont goes bankrupt? The required trust fund should include a means to accommodate affected water rights holders. Most bankruptcy courts require the sale of anything of value; it is likely that this would include water rights. Mere statements that Newmont will replace the water are unsatisfactory for the owners of rights which may be affected.

Responses

Response 19-45

According to the CIA (page 3-67), combined pumping from Goldstrike, Gold Quarry, and Leeville mines would be approximately 2,000,000 acre-feet. Approximately 800,000 acre-feet would be returned to groundwater in the basin of origin. This leaves a deficit of 1,200,000 acre-feet. This "deficit" figure includes beneficial use, such as irrigation, mining, and milling.

Response 19-46

Comment noted.

Response 19-47

The comment concerning eyewitness accounts of seepage would not be seepage from mounding in Boulder Valley (Barrick 2000). Groundwater elevations adjacent to the Humboldt River have not changed from pre-mining conditions. Currently, no seepage into the Humboldt River can be observed in the Maggie Creek Basin. Newmont is complying with NPDES requirements and is not violating the Clean Water Act.

Response 19-48

Based on the variability of Humboldt River flow data, the number of variables involved (including industrial, domestic, and agricultural uses), and resulting precision of modeling, discussion of impacts to water rights was deemed adequate for this analysis. Newmont has always committed to augment low flows in the river, using senior water rights the company owns or controls (BLM 1993b) to mitigate potential impacts to junior water rights.

Response 19-49

The mitigation plan for SOAP (BLM 1993b) outlines Newmont's commitment to supplement impacts to water rights. The BLM has issued new monitoring and mitigation measures for SOAPA in Appendix C and Appendix D in the Final EIS for SOAPA (BLM 2002).

Comments

Impacts to Groundwater Rights: Rights to use groundwater may be impacted when dewatering or the subsequent pit lake formation causes the background water level in the well to be decreased. This increases the pumping costs to the well owner. The CIR primarily just lists potentially affected water rights; there is very little discussion provided in the CIR regarding this issue. CIR at 3-63. The most important factor left out of this analysis is the quantity of water rights that will be affected. We briefly consider two of the basins and other ramifications herein.

19-50 Based on Table A-1, in the Maggie Creek area, there are 2715 afa of certificated water rights. In the Boulder Flat basin, there are almost 23,000 afa of certificated rights. Water applied for could add very substantial amounts to these totals. These rights are for irrigation, stock water or mining other than Barrick and Newmont. If the water levels are lowered such that it is too expensive to pump, there will be a decrease in ranching output from the region. The socioeconomic analysis merely states that a decrease in production could occur but attempts no quantification. CIR at 9-2 The county and local economy has no estimate of the long-term decrease which could be caused by lowered water levels. The BLM has actual estimates of drawdown at each well; it should estimate the actual costs associated with the expected drawdown.

The total certificated rights in the Boulder Flat basin substantially exceed natural recharge (Table 3-3, CIR at 3-13). The groundwater pumpage for dewatering (which approaches 100 kaf/y, Table 3-18, CIR at 3-68) suggests that there will be substantial problems with the groundwater rights as the drawdown expands. Also, the State Engineer has approved irrigation rights that far exceed the natural recharge rights.

Sediment Transport and River Morphology: The description of factors controlling sediment discharge at a point is misleading. CIR at 3-34. It should acknowledge the difference between suspended sediment and bedload transport. This is important because the controls are significantly different. Watershed conditions primarily affect the suspended load. Bedload transport is a function of shear of the flow which is a function of hydraulic radius and bed slope. Bedload transport increases with width, decreasing depth and channel gradient if all else is constant. It also determines the shape of the channel which is why we mention it here. The more frequently the threshold stress is exceeded, the more frequently the channel shape may change.

19-51 Several factors could explain the decreasing sinuosity. Unfortunately, the length of time used for comparison, the lack of consistency among reaches and the varying meteorological events in the period render interpretation almost impossible. The high flows of 1983 and 1984 could have straightened the stream by cutting off meanders.

The river channel could change as a result of the increased base flow. Rivers and streams tend to form a low-flow channel that corresponds with the flow that occurs for many months each year[2]. If riparian vegetation becomes established, the new baseflow channel could exist semi-permanently. If it narrows the current channel by cutting off or filling meander scars or decreasing the baseflow width/depth ratio, the riparian vegetation may become established and be able to survive the eventual loss of dewatering water. This would be a net beneficial result of the dewatering. However, in the long-run, the new riparian vegetation could increase losses to ET. Also, the increased vegetation could increase the resistance to flood flows and increase the area of inundation. Discussion of these impacts should be added to section 4.3. CIR at 4-17.

Responses

Response 19-50

Comment noted. It should be noted that many certificated water rights are not currently used. Also, Newmont or Barrick owned companies control several certificated water rights. Newmont has committed to use senior water rights to mitigate mine related impacts.

Response 19-51

Comment noted. BLM does not expect that discharge to the Humboldt River would be necessary or likely from the Leeville Project. Any limited discharges that might result from the Leeville Project would not be expected to change the Humboldt River channel morphology.

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[2] Myers, T.J. and S. Swanson, 1997. Variation of pool properties with stream type and ungulate damage in central Nevada, USA. *Journal of Hydrology* 201:62-81; Myers, T.J. and S. Swanson, 1997. Precision of channel width and pool area measurements. *Journal of the American Water Resources Association* 33:647-659. Myers, T.J. and S. Swanson, 1996. Long-term aquatic habitat restoration: Mahogany Creek, NV as a case study. *Water Resources Bulletin* 32:241-252. These studies documented this low-flow channel, which forms within the active channel which is normally considered the channel which forms based on the average annual flood event.

Comments

Flows to the Humboldt Sink

19-52

Contaminant Loading in the Lower River: With annual increases ranging to 400% depending on contaminant, the increase in contaminant loading is alarming. CIR 3-88-98.[3] However, the BLM has failed to do any significant analysis of this increased loading.

For example, below the Rye Patch gage, there will be substantially increased concentrations of TDS, fluoride, arsenic and other metals. CIR 3-92-96. However, there is no estimate of how this might affect the irrigated agriculture below Rye Patch. The BLM should present soil analysis from the fields to show whether the soils can support additional salt or arsenic loading or will this be the beginning of the end for irrigated agriculture in Lovelock.

Second, a similar analysis should be done for the Humboldt Sink. How much of an increase in soil loading will these additional loads cause? Will this present a risk to wildlife or migratory birds using the wetlands? The only analysis in the CIR discusses concentrations in the water in the lake but not in the soils. CIR at 5-32.

The loading caused by the mine water discharges causes water quality standards on the lower Humboldt River to be exceeded. As the river flows to its end, its flow volume decreases. The higher flows have a much wider surface area which causes much increased evaporation loss. The increased surface area at Rye Patch also increases the evaporation rate. The discharges reported with the water quality data show a 29% decrease between Carlin and Rye Patch. CIR at 3-45. This explains part, but not all, of the increased concentration in various contaminants. For example, average arsenic concentrations have more than quadrupled while TDS has almost doubled. Clearly, there are both additional natural sources and evapo-concentration occurring between the gages. Some of the reactive metals, such as iron, have decreased.

The CIR correctly recognizes that contaminant loads for conservative substances are a function of the total loading added to the river. It is unclear whether the load calculations include the natural increases due to inflow discussed in the previous paragraph. Concentration at a point depends on the actual flow rate in the river. Most of the dewatering loading enters at Maggie Creek or Lone Tree. These loads come with up to 100,000 gpm of additional water. CIR at 3-74. The concentration in the river after mixing is the total load divided by the volume of water in the river. As discussed then, the flow rate decreases while load will remain about the same. Of course, irrigation diversions will lead to some attenuation in plant and the soils, but the return flow will also have picked up additional loading.

It is not clear whether the CIR adequately considers all of these processes. It is clear that it makes no estimate of concentration at the lower gage and there is no discussion of whether the river water quality standards will be affected. For example:

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[3] Figure 3-29 (CIR at 3-98) is misleading because it considers a time period that both begins before and ends after most of the discharge to the river. The figure suggests that many contaminants are only increased by around a 25% is a function of the long baseline period considered. The primary problem is that the pumpage for Leeville, from 2011 to 2018, into the river is slight compared with the pumpage from 1994 through 2011. The extra time just increases the base against with the loading due to mining is compared.

Responses

Response 19-52

Loading calculations presented in the CIA are based on conservative assumptions that include no infiltration within Boulder Flat hydrographic basin, which result in large discharges from both Betze/Post, Miekle and Leeville. Discharge to the Humboldt River has not occurred since early February 1999 from Boulder Flat. In addition, the CIA assumed Lone Tree would reach dewatering rates projected in its Final EIS, which has not occurred. Lone Tree dewatering rates have been significantly lower and Lone Tree has implemented infiltration basins, both of which have significantly reduced discharge to the Humboldt River. BLM believes that the CIA used conservative assumptions and actual conditions will result in considerably less impact.

Loading calculations presented by Great Basin Mine Watch are based on their predicted reduction in flow rate in the Humboldt River by 50 percent. It is unclear if Great Basin Mine Watch reduced flows for the entire year, including spring runoff. BLM does not expect any impacts to flow generated by snow melt and storm runoff within the Humboldt River. A reduction of flow in any loading calculation would be incorrect.

BLM does not expect discharge to the Humboldt River as a result of Leeville dewatering, thus it would not contribute to any potential geochemical loading of the Humboldt River system.

Comments

19-52

1. The average for arsenic is 31 µg/l for the period 1970 through 1991[4] while the standard is 50 µg/l. The increases between 2000 and 2007 range from 80 to 100%. CIR at 3-26. This indicates that concentrations will approach 50 µg/l for eight years which clearly violates water quality standards.[5] Noting that the maximum levels exceed the standard, it is clear that arsenic concentrations will exceed the standard much more often.

2. The boron standard is 750 µg/l for irrigation while the average and maximum is 471 and 580 µg/l, respectively. Dewatering increases boron loading by up to 120% from 1998 through 2007. This means that concentrations with dewatering should approach 1000 µg/l which exceeds the standard.

3. Average TDS already exceeds primary drinking water standards. With the additional loading caused by mine dewatering projected to increase by 30%, TDS concentrations will increase this violation.

4. Fluoride may become the contaminant of worst violation. Currently, fluoride concentrations are just under the irrigation standard of 1.0 mg/l. CIR at 3-45. Fluoride loading will increase by as much as 400% which will cause concentrations at Rye Patch to violate both irrigation and livestock watering standards.

This suggests that dewatering is and will continue to cause violations of water quality standards in the Humboldt River below Rye Patch. This clearly has negative impacts on irrigated agriculture and the wetland ecosystems in the Humboldt sink. The BLM clearly cannot approve additional dewatering discharges to the Humboldt River because they will continue and increase the magnitude of the violation. To do so would be to approve undue degradation. Thus, the only way dewatering discharge to the Humboldt River can be allowed to continue is to require that the contaminants of concern, including fluoride, boron and arsenic be removed from the discharges.

19-53

There is no analysis of observed concentrations since 1991. Why is this? Are the data no longer being collected? We checked the WEB page of the Humboldt River project being managed by the Geological Survey and found water quality data only for upstream stations near the mines. There is no discussion of observed contaminant concentration changes since the commencement of dewatering.

19-54

Aside from the dewatering drawdown and flow decreases near the Carlin Trend, the massive contaminant loading and consequent concentration increases represent a major impact from dewatering. The lack of analysis of current concentrations as well as soil contaminant concentrations represents a major deficiency in the analysis. The BLM has the authority to require the collection of additional data if it feels the data is necessary. As the IBLA has ruled, "insofar as BLM has determined that it lacks adequate information on any relevant aspect of a plan of operations, BLM not only has the authority to require the filing of supplemental information, it has the obligation to do so. We emphatically reject any suggestion that BLM must limit its consideration of any aspect of a plan of operations to the information or data which a claimant chooses to provide." Great Basin Mine Watch, et al., 148 IBLA 248, 256. To do an adequate job in this cumulative impact analysis, the BLM must collect additional data and better analyze the concentrations.

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[4] All of the discussed averages were included in Table 3-14. CIR at 3-45.

[5] In all of the examples, we have estimated the decrease in flow rate from dewatering to be about 50%.

Responses

Response 19-53

The CIA used the best available data for the analysis as listed in the text. Additional data were not collected for the project. The CIA team did not select the water quality parameters. Seiler and Tuttle (1996) collected the Humboldt Sink water quality data. Newmont is required to submit quarterly discharge reports to NDEP.

Response 19-54

All discharge water meets NPDES standards. BLM has determined that available data for the analysis were adequate and that collection of additional data is not warranted.

Comments

19-55 **Impacts to Riparian Areas**: The analysis of impacts to riparian areas appears to consider only riparian areas lying within the 10-foot drawdown zone. CIR at 4-14. If this is true, it ignores the fact that rivers and streams are flux boundaries in the groundwater model with specified heads. Small head changes near the stream can significantly change the gradient driving flow from the stream. If the groundwater remains connected to the stream but with a steeper gradient, the flux from the stream into the aquifer will increase. These impacts occur with no head change at the creek. For this reason, the document underestimates impacts to riparian areas.

Native American Religious Concerns

19-56 Jim Kuipers' review of the adequacy of the analysis in the DEIS stands alone:

> As a part of my technical endeavors and because of my personal background I have endeared to understand Native American concerns from the standpoint of their application to the federal and state regulatory processes. The DEIS makes the unsupported statement that *Implementation of the Proposed Action and Alternatives would have no direct or indirect impacts on Newe/Western Shoshone traditional cultural values, practices, properties, or human remains.*
>
> This incorrect statement shows the BLM's inability to understand or appreciate Native American issues. If they were to understand or even respect the religious beliefs of the Newe/Western Shoshone people they would acknowledge that mining activity such as that described in the Leeville DEIS is in direct contradiction to the religious principles of the Newe/Western Shoshone people. This demonstrates the BLM's disregard for the level of cultural understanding and appreciation that is not evident and must occur before they can adequately discharge their legally required trust responsibilities to the Native American people who are affected by their actions. I fail to make a constructive recommendation as it is my conclusion that the BLM is incapable of carrying out their legally mandated trust responsibilities in this regard.

General Comments

19-57 There is an error in Chapter 1 where the BLM identified the uses of gold. Gold is no longer used as a "standard for monetary systems" by any significant number of countries. In 1971, the International Monetary Fund required member nations to stop using gold as a currency standard. The United States stopped using it as a standard; if the U.S. would sell the 8600 tons it holds in central banks at today's prices, the Treasury would receive a $82,000,000,000 input.

19-58 Newmont would temporarily stockpile refractory ore at the project area, or it will directly haul it to the South Operations area. DEIS at 2-23. Newmont could decrease their disturbance by directly hauling it at all times and the BLM should require them to do so. There appears to be no reason other than convenience for temporarily storing it. In fact, it would be cheaper to haul it directly because it would not have to handled twice.

Responses

Response 19-55

Comment noted. The CIA document also considers baseflow reductions outside the 10-foot drawdown isopleth, down the Humboldt River to the Humboldt Sink.

Response 19-56

See Appendix A of the Leeville Project Draft EIS for a "Summary of BLM Consultation Efforts and Information Exchange Related to the Leeville Project".

Response 19-57

Comment noted. Gold continues to be used as a monetary standard by some countries.

Response 19-58

Ore is occasionally stockpiled in order to allow maintenance on processing facilities, or to blend ore to maximize efficiency of recovery, and to optimize control on feed to ore processing to ensure compliance with air emission requirements.

Comments

19-59 The DEIS fails to discuss the amount of gold to mined from the project. In most EISs that we have reviewed, this information is provided. It is essential for the public to know how much gold is being removed from its domain, especially since the public gives it up for free. More importantly, it is essential to provide this information so that an assessment of whether the project is economic can be made.

19-60 Newmont will continue exploration in the project area. Will Newmont also be doing exploration at levels deeper than the proposed action? Will they drill exploration borings from the bottom of the Leeville shaft? Could the Leeville Project be proposed to go deeper? Continuing this line of questioning, does Newmont have existing borings that go below the bottom of the proposed action? If so, the BLM has a responsibility to consider whether these borings indicate the project could go deeper with more significant impacts primarily from dewatering.

Thank you for reviewing our comments. We look forward to receiving a new DEIS with an analysis of a grouting alternative and with the appropriate existing conditions.

Sincerely,

Tom Myers, Ph.D.
Executive Director

cc: Western Mining Action Project

Responses

Response 19-59

See *Social and Economic Resources* section of Chapter 4 in the Leeville Project Draft EIS. Newmont pays a variety of taxes as a result of mining activity including property taxes, net proceeds of mining taxes, and sales tax on goods and services purchased by Newmont. Decisions regarding the economic feasibility of the Project are the responsibility of the applicant. BLM and NDEP will determine an adequate bond for the Project.

Response 19-60

An unknown potential exists for lateral expansion of the Leeville Project. Current drilling information is not conclusive on the ore body at depth. In addition, increased pumping duration and/or pumping volume and depth of mining would need to be considered in order to determine if gold reserves occur at depth. Any expansion proposed by Newmont for the Leeville Project would be subject to review under NEPA and NDEP regulations.

Attachment 1
Review of Groundwater Model

Prepared by Tom Myers
Center for Science in Public Participation
Reno, NV

19-61

This review of the groundwater model is in two parts. First, we reviewed the utility of the code. This was necessary because Newmont chose to a proprietary model developed by HCI rather than use publically available code. The BLM contracted with scientists at the Sandia National Laboratory to review the code as it is used in the Carlin Trend. The first section of this review focuses the SNL review as pertains to the Carlin Trend model. The second section is a review of the Carlin Trend model itself.

Utility of the Code

Newmont has used HCI as dewatering consultant for many years. HCI developed the model MINEDW to simulate groundwater movement around a mine. Specifically, the model was designed to simulate seepage into a pit lake. Because MINEDW is proprietary the BLM required an independent third party review of the code to be certain that it solves the groundwater flow equations correctly and that it handles the boundary conditions correctly. Sandia National Labs (SNL) was contracted by the BLM to perform a code review on MINEDW.

SNL (1998) concluded that the mathematical model used by HCI is appropriate for the intended use on the Carlin Trend and that the code uses acceptable finite element techniques to solve the equations of the mathematical model. Tests of the code with various analytic and MODFLOW solutions of basic situations resulted in satisfactory comparisons. However, the code should not be used when recharge is applied to multiple unsaturated layers.

However, there is more to SNL (1998) that sheds doubt on the Carlin Trend models than is discussed in the summary and recommendations.

Errors could be caused by extreme heterogeneity[6]. The tests only considered situations of conductivity changing by two orders of magnitude while HCI (1999) has adjoining elements that change by up to

_______________.

The contrived problem analyzed by HCI for SNL in the report has a variety of problems.

1. The southern river boundary allows ground-water underflow. This does not simulate the situation at Carlin because of the fault bounded basin through which the Humboldt River flows. Unfortunately, this does model the river as HCI did in the Carlin Trend model. This issue is discussed below.

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[6] "Code users are cautioned that the treatment of relative hydraulic conductivity in MINEDW could lead to additional error in the presence of extreme heterogeneity or excessively large time steps". (SNL, 1998 page 12)

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Response 19-61

Attachment 1 - Review of Carlin Trend Model

Boundaries

The discussion about boundary conditions in the June 1999 report on the Carlin Trend Model indicates that the steady-state simulations implement no-flow boundaries in all layers on the west, north, and east sides of the model domain, and constant head boundaries in all layers along the Humboldt River. The constant head nodes beneath layer 1 are set to a higher value of head than at the upper nodes of layer 1 from Carlin Tunnels to Palisades to simulate a vertically upward hydraulic gradient. The transient simulations implement variable flux boundaries in layers 2 through 6 around the entire model domain. The constant head boundary along the Humboldt River and the no flow boundaries elsewhere were retained in layer 1 for the transient simulations. The fixed (via constant heads) upward gradient between lower and upper nodes in layer 1 at the Humboldt River was removed during the transient simulations. The boundary conditions for the model were confirmed in discussions with the modeler.

Excerpts and literature references from the model report (pages 19 and 20), supporting interbasin flow through the deep carbonate aquifer north of the Humboldt River, were cited as evidence that the model boundaries are incorrectly conceptualized and that they may lead to faulty flow directions in the model. Deep interbasin flow through the carbonate aquifer north of the Humboldt River is a controversial topic, even among experts at the USGS. The model report (HCI 1999c; page 22) cites two literature references that support the model assumption of no groundwater inflow from areas beyond the hydrologic study area (HSA). Furthermore, HCI and Newmont maintain that field data demonstrate the compartmentalization, or discontinuity, of groundwater flow in the carbonate aquifer within the HSA. The conceptual model for the HSA that was chosen for the numerical model excludes any potential natural groundwater inflow from the carbonate aquifer beyond the model boundaries. Further support for use of a no flow boundary is provided on page 22 of the HCI (1999c) report.

Comments

2. The contrived problem tests three different grid and node spacings. The problem with this is that the HCI model mixes fine spacing with very coarse spacing, sometimes with very little distance between the two. The figures in SNL show distinct differences among spacings. Interpreting the effect of these differences when the grids are spaced very closely may be difficult. This is discussed in more detail in the next section.

SNL Problems with Node Spacing: As a part of the review, SNL had HCI prepare three scenarios of a contrived model, designed to be similar to the Carlin Trend model, that tested different node spacings compared to different MODFLOW cell sizes. The model domain is 90,000 feet square; element and grid cell spacing for MINEDW and MODFLOW is homogeneous across the domain except where the triangular shape of elements near the boundary decreases. The number of elements and cells depends on the number of layers. For the coarse grid, the MODFLOW cells are 10,000 feet square while the elements are triangular and exactly half the size of the cell. There are five layers for this mesh. The medium mesh has cells sizes exactly half as large as the coarse mesh. The MODFLOW cell sizes are 5000 feet square and the element triangles are half the size of the square. There are 8 layers for this mesh. The fine mesh halves the cell and element size to 2500 feet square. There are 11 layers for this mesh.

19-61 *Steady State Solution*: For the coarse mesh, MINEDW yields a steady state solution for the free phreatic surface that averages about 15 feet above that calculated by MODFLOW with a range to in excess of 30 feet (SNL, Figure A9). Similar differences occur at deeper levels for steady state (SNL, Figures A10 and A11). At the south end of the figures near the constant head boundary, the contours become perpendicular to the boundary. This illustrates the strong influence the constant head boundary has on the head in the cells/elements near the boundary. The shape of the water table near the constant head boundary (river) causes a steeper gradient for MINEDW which explains the 5% higher flow to this boundary for the coarse grid. (**does this coincide with model predictions on the coarse grid portions?**) The finer discretization yields much closer agreements between the two model codes.

The finite element mesh of the Carlin Trend model has regions with element size exceeding that of the SNL test. The largest elements occur in the Susie and Maggie Creek areas, including the area along the Humboldt River (constant head boundary on the south side). It suggests that the steady state calibration could be off by up to 30 feet[7].

Another issue not considered by SNL is the effect of rapid changes in element size. The Carlin Trend finite element mesh (HCI, 1999, Figure 8) decreases from dimensions of two miles or more to less than a quarter mile in just two miles. This occurs in the transitions from the Susie and Maggie Creek areas to the Post/Betze and Gold Quarry areas. It also occurs from the Rock Creek and Willow Creek valley areas to the north end of the Post/Betze area. Finite difference models, such as MODFLOW, recommend that the cell dimensions not be decreased by more than 50% from one cell to the next (Anderson and Woessner, 1992, page 64). This will be discussed more in the sections below devoted specifically to the Carlin Trend model.

Transient Solution: The test case provided a single well located in the middle of the domain coinciding with the mountain range dividing the basins. The well pumps 12.5 cfs for 20 years and then not at all for

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[7] Actually, it could be higher if coarser grids would cause an even larger disagreement because the 10,000 foot elements in the test are much smaller than those in the actual model.

Responses

Model output provided by HCI indicates that changes in flux at the constant head nodes representing the Humboldt River during transient simulations are very small (<< 1 cfs at each node). All nodes, except one, representing the gaining reach of the river discharge less groundwater (to the river), but there is no conversion to a losing reach during the transient simulation. A single node converts from discharging to the river to supplying a very small amount of water (< 0.01 cfs) to the aquifer for a period of time, apparently during the period of maximum stress on the aquifer, subsequently returning to the discharging state. The ten-foot drawdown isopleth is closest to this naturally gaining reach of the river, indicating that the maximum effects of aquifer stress on the river occur along this reach. Changes in constant head fluxes during the transient simulation along naturally losing reaches would be very much less than those documented for the gaining reach. It is clear from this analysis that the constant head nodes representing the Humboldt River are not limiting the expansion of the cone of depression for the transient simulations that were performed. These results indicate that it is unnecessary to represent the river with a variable flux boundary under the stresses that were simulated.

Moving the model boundary south of the Humboldt River would not increase the accuracy of the predictions. Additional uncertainty would be introduced within the model domain due to a paucity of data south of the river.

The variable flux boundary in MINEDW was discussed with HCI, and documentation of the algorithm was reviewed. The variable flux boundary in MINEDW, implemented in layers 2 through 6 beneath the Humboldt River during transient simulations, is dissimilar to the MODFLOW variable flux boundary (general head). Fluxes in the MINEDW boundary are proportional to the drawdown that occurs at the boundary, not relative to head external to the model. The flux under steady state conditions is set at each of the variable flux boundary nodes as initial conditions for the transient simulations.

Comments

19-61 60 years. Contours of the freewater surface, heads at various levels, and the coinciding drawdowns, along with hydrographs at three target points were plotted after 20 years of pumpage and 60 years of recovery.

Drawdown for the MODFLOW test exceeded that for MINEDW in the coarse mesh by up to 30 feet for the free surface (SNL, Figures A12 through A26). Away from the well, 15000 feet south of the well, the free surface predicted by MINEDW shows a bump where the level is about 65 above the MODFLOW prediction (SNL, Figure A12). Again, MINEDW may overpredict the recovery amount and rate of recovery (SNL, Figure A24 and A26). Drawdown at the well is similar for each well (SNL, Figure 25). Predictions improve markedly for finer mesh sizes. We conclude that MINEDW underpredicts drawdown away from the well when compared to MODFLOW. These are the points where the finite element mesh is very coarse and also the area most affected in the future by the dewatering in the area. It is also the area in which the BLM is predicting the maximum extent of impacts on which it may base the final decision.

The fact that finer meshes yielded better agreement between the models may be a function of the increased number of layers. The Carlin Trend model has up to eight layers (some layers "pinch out") which is less than tested by SNL. As stated in SNL (page A9), "[t]he goal of increasing vertical discretization is to refine the calculation of head." Perhaps the improved agreement is due to increased layers as much as to the finer discretization. This lowers the reliability of the final results of the SNL review.

Review of the Carlin Trend Model (CTM)

Once the concerns with the MINEDW code are overcome, there are three primary problems with the Carlin Trend conceptual model. These are boundaries, faults and the basal clay layer underlying the Carlin formation.

Boundaries: The boundaries of the CTM coincide with topographic divides on the east, north and west and the river on the south. These assumptions leave much to be desired. The following paragraphs illustrate our concerns.

There are two primary groundwater flow systems in the model, the shallow unconfined system and the deep, confined system in the carbonate and volcanic rocks[8]. HCI(1999) emphasizes that they do not function as a single unit and that flow directions and rates are likely to be different[9]. They also cite two U.S. Geological Survey references indicating that the deeper system covers many basins and that flow is

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[8] HCI, 1999, page 19. The "deep, generally confined system" occurs primarily in carbonate and volcanic rocks.

[9] Id.

Responses

Given the uncertainty in geologic and hydrologic conditions south of the Humboldt River, the variable flux boundaries implemented during the transient simulations are appropriate. Drawdown contours in hydrostratigraphic units below the river that may intersect the boundary can be projected south of the river.

Great Basin Mine Watch's discussion of the underestimation of river fluxes is incorrect and inconsistent with previous statements about flux from the river. The current boundaries could overestimate fluxes (but don't for these transient simulations; see discussion above) from the river due to the use of constant head cells in layer 1 during the transient simulations. River seepage is not dependent upon head north or south of the river, but rather head beneath the river. Actual seepage does not increase without limit when the head drops beneath a river. Also, variable flux boundaries in layers 2 through 6 can permit drawdown beneath the river in these layers while implicitly simulating drawdown south of the river.

The no-flow conditions on the western, northern, and eastern boundaries implemented for the steady state calibration represent *divergent* groundwater divides beneath mountain ranges. The boundaries are appropriate. The conceptual model of no underflow in the carbonate aquifer that was chosen for the numerical model precludes the use of any other boundary conditions for this aquifer in the steady state simulation.

The implementation of variable flux boundary conditions around the entire model domain in layers 2 through 6 during the transient simulations resulted in a combined maximum inflow of about 5 cfs (HCI 1999c). This rate is very small, indicating that model boundaries are little impacted, and that the stress demands are satisfied primarily from storage losses and recharge within the model domain. Even the small inflow at the boundaries does not prevent expansion of the cone of depression (drawdown at the boundaries) for the transient simulations with the use of the MINEDW variable flux boundaries.

Comments

19-61

regional[10]. The conceptual model boundaries do not adequately reflect this information and may in fact lead to faulty flow directions in the model.

Chapter 3 (HCI, 1999) indicates that boundaries

> "have been selected to coincide with natural hydrologic boundaries to limit the amount of ground-water and surface-water flow that naturally enters and exits the [model]. The topographic divides along the edges of the [model] have been assumed to be no-flow divides for both surface and ground water. The exception is the southern boundary along the Humboldt River which is simulated as a constant head boundary and allows ground-water to flow into or out of the [model].[11]

First, HCI needs to verify whether these boundaries are the same for both steady state and transient simulations. Figure 17 and Chapter 4[12] indicates that variable flux boundaries are used variously in the transient simulations. The following comments assume that the east, north and west boundaries are no-flow during steady state conditions and variable flux during the transient calibration and production runs.

Second, the assumption of no flow boundaries in the carbonate layer disagrees with most people's understanding of the regional carbonate system. This concerns the selection of the eastern boundary to be no flow in steady state[13]. This assumption creates two problems. First, the only source of water to the carbonate in the model will be recharge within the basin. In the steady state simulation, HCI applies recharge on the surface which then moves vertically downward to the carbonate and then laterally into the rest of the unit. Part of the justification provided by HCI is that the flow direction specified by Harill and Prudic (1998) (toward south-southwest) will parallel the boundary. That the flow would be perpendicular to the boundary in the model contradicts the flow conditions that HCI attempts to emulate in the model and that established by the USGS[14]. The model does not simulate the actual flow directions in the steady state condition. If the flow direction in the carbonate near Carlin actually is to the south-southwest, it must originate somewhere in the regional carbonate aquifer and flow into the model domain.

Responses

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[10] "Unlike the shallow ground-water flow system, the deeper system is not limited to a single hydrologic basin." Id. "[T]he middle Humboldt River basin north of the Humboldt River, (sic) is underlain by a single extensive ground-water flow system where ground-water divides typicaly do not oincide with topographic divides." (HCI, 1999, pages 19-20) See Plume and Ponce (1999). Also, "Harrill and Prudic (1998)...also cite evidence for interbasin flow in the carbonate aquifer system." (HCI, 1999, page 20).

[11] HCI (1999), page 22, emphases added.

[12] HCI (1999), page 53.

[13] Note 6.

[14] As cited by HCI (1999), page 22. "Harrill and Prudic (1998) show generalized flow directions in the carbonate aquifer to be south-southwest in the vicinity of Carlin". As set up in this model, the flow will be to the west, at least along the boundary. The extent of the motion westward will depend on aquifer properties. HCI should provide a map showing the direction of flow in each layer for the steady state model.

Comments

Responses

19-61

During the steady state calibration, the constant head boundary on the south side at the river in layers 2 through 6 is appropriate because it allows for flow to leave the model domain. But the river boundary as a constant head is very close to the Gold Quarry mine and inappropriate for analyzing the dewatering pumpage during transient pumpage. The problem with modeling the river as a constant head during transient conditions is that a constant head boundary is essentially an unlimited source of water. There is no limit to the flow that may be drawn from the boundary; very small changes in head north of the river would pull all of the water needed for the water balance in the arbitrarily defined model domain. A constant head boundary tends to maintain the boundary at steady levels. This, along with the arbitrary location of the variable flux boundary in layers 2 through 6, limits the extent of the ten-foot drawdown isopleth. The river should be modeled as a variable flux boundary during transient simulations.

The boundary of the domain should be moved further south because there is no physical reason to choose the Humboldt River. While it manifests as a boundary on the top layer, there is no manifestation of the river in lower aquifers (layers). The problem is that variable flux boundaries limit head changes that could occur in the aquifers beneath the river. It has been explained to CSPP that the type of boundary used by MINEDW allows the head to go up or down depending on the need. Our experience with similar boundaries in the MODFLOW model suggests that a variable flux model allows little change in the head at the boundaries; substantial head changes in the domain near the boundary changes the gradient across the boundary which increases flow across the boundary. (Note that HCI does not provide the parameters used in the boundary nor does it provide the model flows across any of the boundaries, except the rivers.) Thus, head changes could draw flow from an imaginary reservoir south of the river. There is a fault block mountain just a few miles south of the river. If this is essentially a no-flow boundary or an aquifer with little contact with the alluvium beneath the river, it is possible that the variable flux boundary provides more flow than is reasonable or would be actually observed in Nature.

Also, the boundaries prevent the simulation of drawdown south of the river which may underestimate the river flux. The model allows flow from the river to go only north. This model cannot simulate drawdown south of the river because of the boundaries discussed in the previous paragraph. If mine dewatering or pit lake inflow actually lowered the head levels south of the river, then water would flow from the river in both directions. This model has been designed with the assumption that drawdown can not extend under the river in any layer which means that the model probably underestimates the flow from the river.

After arguing that flow in the deep, bedrock aquifers do not coincide with basin boundaries and stating that there is little data on which to determine the boundary type[15], HCI assumes there is no flow across the northern or western model boundaries[16]. This creates the same problem discussed above with vertical flow movement in the layers near the boundary and flow perpendicular to the boundary for a distance extending from the boundary that depends on the aquifer properties.

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[15] "There are few data to support or refute the assumptions of no-flow boundaries on the northern and western boundaries of the HSA." (HCI, 1999, page 22)

[16] Consequently, HCI has assumed that there is no flow, **under pre-mining conditions**, into or out of the HSA on its northern and western boundaries." Id., emphasis added. That the statement specifies "pre-mining conditions" is important because it means the model uses unstressed conditions (steady state) to assume a limit to the propagation of stress under transient, dewatering conditions.

Comments

The only way the boundaries as modeled by HCI have any credibility is to present a table showing the flow across each boundary during steady state and transient conditions. The hydrologic budget shown in Table 5 is not sufficient. Compare the fluxes caused by dewatering with those observed or assumed during the steady state conditions. (By assumed, setting certain boundaries as no-flow assumes that flow is zero.) The presentation should include fluxes for the steady state calibration, transient calibration, simulation of dewatering through 2010 and simulation of recovery from 2010 through 2110. Significant differences will show that the boundaries are too close the pumping. If the applied stresses cause flow to cross the boundary, it could be that the boundaries artifiCIRlly limit the extent of the drawdown cone.

19-61 **Aquifer Units**: Potentially, the biggest problem assoCIRted with the aquifer units is the pervasive basal clay layer at the base of the Tertiary sediments in the Maggie, Susie, and Marys Creek areas (commonly known as the Carlin formation). The modeling of this layer prevents the propagation of stress from bedrock to the Tertiary sediments which in turn prevents the dewatering of Maggie Creek. See the discussion below and the attached analysis of the sensitivity of this assumption. Therefore, the documentation of this extremely important layer requires more than the personal communication[17]. HCI should include a detailed discussion of the evidence for the clay layer that includes well logs and piezometric data showing that dewatering of the bedrock has not affected the Tertiary sediments. This information is important enough that it should be included in the DEIS as well as the GWMODEL.

Additional information is needed to justify the assumed low hydraulic conductivity for the Carlin formation. An unattributed statement in HCI (1999), "[a]n assoCIRted low hydraulic conductivity for the Tertiary sediments east of the Tuscarora Mountains and the basal clay layer are incorporated into the conceptual hydrogeologic model."[18] This differs from statements of the USGS. Based on aquifer tests, Plume stated that "[h]ydraulic conductivity ranges from 2 to 7 ft/d; mean and median values are 4 ft/d."[19] The BLM cannot allow Newmont and HCI to assume away this high conductivity estimates, based on field tests, with a mere statement in the groundwater model report.

Dewatering has occurred in the region for about 10 years. The report should include information about how much water is withdrawn from each aquifer layer. It should also include a table showing the wells in the model and that the water withdrawn from the model layers actually corresponds with the water actually removed from different aquifer units. Even if the total model dewatering pumpage is close to actual, if it is not from the same aquifer units, the model does not simulate reality. This should be added to section 4.9 which discusses the pumping and nodes. The requested table would enable the reviewer to assess whether the model removes the water from the proper layers.

Use of Faults: In general, faults are a very important feature that control flow throughout the model area. It is very important that their use be justified. It is also important that their extent, both laterally and vertically, be justified. The modelers should discuss the sensitivity of their assumptions. For

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[17] The BLM accepts the following statement in HCI (1999). "East of the Tuscarora Mountains, inthe Maggie, Susie, and Marys Creek Areas, the Tertiary sediments tend to be clay- and silt-rich; and there is a pervasive basal clay layer (P. Pettit, NGC, pers. Commun., 1997)." Because the predictions of limited impacts to Maggie Creek depend on this assumption, the BLM must demand better documentation.

[18] HCI, 1999, page 25.

[19] Plume, 1995, page 18.

Responses

Aquifer Units

Great Basin Mine Watch points about documentation of the nature and extent of the clay layer at the base of the Tertiary sediments places too much emphasis on this layer with respect to predicting impacts to the Carlin Formation and streams. The modeled clay layer should be understood in the context of the geology of the Carlin Formation. The layer in the model and the calibrated low hydraulic conductivity account for the combined effects of numerous low permeability layers within the Carlin Formation that cannot be explicitly incorporated at the scale of the model due to numerical limitations and, consequently, the required simplifications for a regional model. The Carlin Formation is represented in the model as one layer. The actual stratification of the formation results in a net effect of very limited transmission of water from the Carlin Formation to the underlying siliciclastics.

It appears the modeled hydraulic conductivity of the Carlin Formation is an order of magnitude (and more) lower than some site-specific data indicate (Plume 1994). The site-specific data were generated from five aquifer tests at three wells. Two of the wells are reportedly production wells, at which four tests were conducted. It seems, therefore, that the test data on hydraulic conductivity may be from anomalous zones in the Carlin Formation, in which wells were completed for the purpose of producing water. The Carlin Formation consists of semi-consolidated, old alluvial sediments that are clay and silt rich, and contain volcanic rocks. The Carlin Trend Model values of hydraulic conductivity for the Carlin Formation, developed through model calibration, are reasonable based on typical published values for these strata.

The BLM has reviewed Carlin Trend model results for several years and believes the model simulates, to the extent possible, dewatering from the various hydrostratigraphic units. The lower plate carbonate unit is the primary formation that is subject to dewatering in the project area. According to the 2nd Quarter 2002 Report for the Maggie Creek Basin Monitoring Plan (Newmont 2002b), all Gold Quarry Mine dewatering occurs from perimeter carbonate wells. The majority of dewatering at Post/Betze is also from carbonate aquifers, with only about 5 percent ever having come from dewatering of Carlin formation aquifers on the east wall of the pit for stabilization (Zhan, 2002). Numerous calibration plots have been performed on a periodic basis using water level data from many wells completed in the various geologic units. Five hydrostratigraphic layers were used to represent site-specific conditions and the various zones that are dewatered during model runs. More specific information about the model layers can be obtained from two Hydrologic Consultants, Inc. (HCI) reports (HCI 1998, 1999a). A listing of wells and results of water level monitoring are presented in the Maggie Creek Basin Monitoring Plan quarterly reports prepared by Newmont.

Comments

19-61 example, the modelers presume that the Post Fault is a barrier at depth to flow from the northeast in the Carbonate unit even though there is no proof based on piezometric data[20] and there is no offset in the formation[21]. It seems very possible that drawdown occurs to the northeast of the Carlin Trend in the carbonate but not in the overlying, and monitored, siliclastics.

There are at least two potential pitfalls resulting from this assumption. Dewatering may actually be decreasing the pressure in the aquifer beneath the siliclastics; delayed stress propagation between aquifer units could begin to dewater the overlying layer from which many springs and streams get their surface water. This may not become manifest for years until the pit begins filling with water.

The second problem is that the stress could propagate across the model fault by the time pit lake infilling occurs and provide a close convenient source of water to refill the lake in the model that does not exist in reality. In experimenting with groundwater modeling of flow through faults, this reviewer has noted the sensitivity of results to the details of the model. Because there is a severe drop in head through a fault does not assure that no flow occurs. To the contrary, it is possible that the fault provides a conduit for vertical flow. If the transmissivity of the fault, which may have an effective flow area only a few feet thick, is high because of a high conductivity, flow may essentially "plunge". This would occur if the fault caused an offset where the conductivity on the downgradient side is low whereby the fault becomes the easier flow path. Then at the lower level downgradient of the fault, a higher conductivity allows the water to continue its downgradient movement. The fault only appears to be a flow impediment when it actually is a conduit. In other words, the fault could in the model prevent flow that will actually occur in Nature. Faults may constrain the stress and decrease the extent of the predictions in the model.

A corollary is that flow from upstream of the fault (northeast of the Carlin Trend) could flow around the fault and reach the unit being dewatered at the deficit is being filled thereby decreasing the maximum predicted extent of dewatering. The primary flow direction could be northwest along the fault and around the north end into the large drawdown cone being created by the dewatering (and simulated by the model). This nearby source would decrease the deficit and limit the maximum extent of the ten-foot drawdown isopleth.

HCI claims the Siphon fault is a barrier between the TS Ranch and the Post/Betze pit but acknowledges that there is not surface expression[22]. Figure 9, showing the hydrogeology of layer 1, shows the fault separating siliciclastics and tertiary deposits. At least for the top model layer, more proof is needed to justify its use. Different conductivities for the two formations could explain observed head drops. This is a problem because it could limit the propagation of dewatering stress into the Boulder Flat[23].

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[20] "The carbonate rocks are very deep east of the Post fault, and there are no monitoring wells installed in them". (HCI, 1999, page 31).

[21] Section A-A', Figure 14, shows the Post fault separating units of equal conductivity carbonate rock.

[22] HCI, 1999, page 31.

[23] It could also prevent water stored in Boulder Flat as a result of irrigation induced recharge from flowing in to replenish the drawdown.

Responses

Use of Faults

Sensitivity analysis of fault hydrologic conductivity is useful for determining the importance of a conceptualized fault to the modeled flow system. Sensitivity analysis of modeled features is commonly carried out during calibration. According to HCI, modeling the Post Fault as a deep barrier to flow was required for calibration, implying the sensitivity of the model response to the presence of the barrier. The absence of specific data to confirm modeled features to which the results are sensitive does not imply they do not exist. The sensitivity, on the contrary, lends support to their existence. Furthermore, the elongation of the drawdown cone in the carbonates in the direction of the fault trajectory supports the modeled barrier.

The absence of the surface expression of the Siphon Fault is not an argument against its existence. The presence of Tertiary rocks on the west side of the range next to older siliciclastic rocks to the east is reasonable evidence of a range-bounding fault, down to the west. Conceptually, it is easy to visualize the presence of a low conductivity barrier to flow between these two consolidated formations, because faulting can generate barriers to flow in unconsolidated sediments.

The intent of the discussion of the fault north of Leeville was to explain that the fault is a barrier to flow, because the rate of drawdown has not decreased during a period of constant discharge, indicative of a limited supply of water. There is no conceptual problem with this logic.

Comments

The discussion of the Leeville/Four Corners faults is confusing. A flow barrier was added to the Carlin Trend boundary north of Leeville in carbonate rocks based on the following drawdown discussion:

> Drawdown in the carbonate rocks at Leeville has been relatively constant over the past few years even though ground-water flow toward the two existing dewatering centers...has also been relatively constant. The constant drawdown with relatively constant dewatering pumping suggests that the carbonate rocks at Leeville are part of a highly bounded system. In a non-bounded aquifer, the rate of drawdown decreases with time when a constant discharge is applied.[24]

This suggests that water levels are constant while in a bounded aquifer the water level should go down at a constant or increasing rate. (The constant rate of drawdown with constant pumping reflects a bounded system because the boundary will limit flow to the pumps. In an unbounded system, the expanding drawdown cone draws flow from much larger areas decreasing the near-well drawdown.) There may be a misprint in this section.

19-61 **Evapotranspiration:** The report suggests that areas of ET in the model are significant, especially in the areas of significant agricultural usage[25]. However, the model report refers to rates from greasewood, grasses, shrubs, cattails and hydrophytes, not from irrigated areas. Typically, in our models, we have used a net recharge from irrigated areas because there is always more than consumptive use applied to a field. There is no discussion of recharge from irrigation in the Recharge section. Please explain how ET and recharge from agricultural areas was modeled.

Regarding greasewood, the report indicates that 50 to 55 percent of the annual ET rate of 14.5 to 17.5 inches to be from the groundwater system[26]. Greasewood primarily occurs in low elevation, low precipitation zones. Where does the nongroundwater system ET come from? Especially during showers, some of the annual precipitation runs off and becomes unavailable for use by the greasewood.

The calculation that only 50-55% of greasewood ET results from groundwater would also apply to other phreatophytes. Discussion regarding the other plants do not include a breakdown between groundwater and direct surface water as a source of the ET water. Please clarify this and explain.

The method used to estimate hydrophyte ET may overestimate the amount. As described[27], the method uses a ratio of hydrophyte ET to open water surface evaporation. Our experience with similar research articles is that they apply to hot desert climates more than the cold deserts in the study area. For example, the longer hot periods in southerly climates leads to many more months of ET as well as

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[24] HCI, 1999, page 32.

[25] HCI, 1999, page 35.

[26] HCI, 1999, page 35.

[27] HCI, 1999, page 36. The method utilizes an observed direct correlation between hydrophyte ET (ETh) and open water evaporation. However, the citation to Crundwell (1986) is not easily accessible even though the source appears to be a peer-reviewed journal.

Responses

Evapotranspiration

Evapotranspiration from vegetation is very difficult to quantify in any model. A sensitivity analysis is run in order to define how sensitive a model is to changes in evapotranspiration. The sensitivity analysis for the HCI (1999c) model shows that the model is not sensitive to increasing the evapotranspiration rates, but very sensitive to decreasing the rates.

Section 3.9 of HCI's (1999c) modeling report discusses the simulation of recharge from irrigation water to the groundwater system. Recharge from irrigation was applied in Boulder Flat following a standard practice where it is assumed that 30 percent of the water distributed to irrigation is returned to the groundwater system. A significant area of Boulder Valley is under irrigation and complete water records are kept, making it a logical area to apply the recharge of water pumped for mine dewatering.

Robinson (1970) conducted a four-year study of evapotranspiration of woody phreatophytes in the Humboldt River Valley near Winnemucca, Nevada. The U.S. Geological Survey (USGS) conducted the study in an area very near the hydrologic study area, therefore, the data were considered adequate for modeling purposes. On pages D31-32, Robinson (1970) states: "The data obtained in the evapotranspiration tank studies at the Winnemucca test site indicate that during 1963-67, average water use by greasewood ranged from 1.21 to 1.45 acre-feet per acre in tanks 1 and 2, of which 50 to 55 percent was supplied by groundwater." Rainfall and soil moisture comprised the remainder of the water lost by evapotranspiration. Soil moisture is derived from winter precipitation. Robinson's (1970) study implies that the rate of groundwater lost by greasewood evapotranspiration could range from 7.26 to 9.57 inches per year. HCI assumed an average value of 8.4 inches.

Most of the greasewood evapotranspiration was simulated to occur in Boulder Valley where elevation is above 4,500 ft and annual precipitation is greater than 8 inches. This area is rather flat and little surface runoff is expected to occur. Assuming that 3 percent of precipitation becomes groundwater recharge, leaves nearly 8 inches available for "non-groundwater evapotranspiration." The amount of precipitation and evapotranspiration are in agreement with Robinson's study and the assumptions made for the Carlin Trend Model.

Most studies do not include a breakdown of the source of water consumed by evapotranspiration (i.e., groundwater, precipitation, or soil moisture). Therefore, the percentage of groundwater versus other water was not specifically stated for all plant types. The amount of evapotranspiration that occurs in an area is dependent upon many variables such as species of plant, cover density, plant size, stage of maturity, tolerance to salts in the soil and water, temperature, wind movement, humidity, solar radiation, rainfall, and length of growing season. These features vary in time and space. In a regional study these components are averaged to result in a reasonable estimate of potential evapotranspiration rates. The evaporation rates used in the Carlin Trend Model are based on peer-reviewed studies, most of which were conducted in the Humboldt River basin (Dylla et al. 1972; Robinson 1970).

Comments

warmer open water temperatures. How this affects the ratio and the prediction of ET from the study area must be discussed.

Surface Water and Spring Flow: This comment section will just discuss the analysis of surface flows and gaining/losing reaches. The broader question, how will the streams and springs be affected by dewatering, will be addressed below.

The nonparametric method of determining the most common October baseflow is interesting. Before rejecting normality and log-normality[28], it is important to perform the appropriate tests. Aa chi-square test for normality should be performed before using the dominant cluster mode method.

The dominant cluster mode method essentially uses the mean of the most common, or dominant cluster, of flows. Of interest here for determining the baseflow is the mean October flow[29]. It is necessary to realize that certain thresholds may exist that would cause even this baseflow estimate to be off for certain years. Baseflow predominately reflects groundwater contribution. During dry years, irrigation pumpage may lower the water table such that a draft from the river/stream will be occurring in October. In other words, dry years and especially long drought periods have groundwater/surface water relations substantially different from normal or wet years.

19-61 Also necessary to understand is that this estimate is the base from which the effects of mine dewatering will be subtracted. Many years have baseflow less than, some substantially less than, the predicted mean. Based on the discussion in the previous paragraph, it is reasonable to conclude that dewatering could change the groundwater levels, and the threshold, such that more years will fall into much lower flow periods. In other words, it is inappropriate to subtract a loss due to dewatering from an average baseflow the loss due to dewatering will not be constant from year to year. The loss will likely be greater during dry years and more "normal" years will actually become dry years.

To estimate how often the dewatering impacts will be subtracted from below normal flows, the following table[30], shows the number of years and percent of time that the baseflow is less than dominant cluster years.

River	Yrs	Total Yrs	Percent
Humboldt R at Carlin	12	51	24
Maggie Cr at Carlin	2	12	17
Humboldt R at Palisade	12	87	14
Pine Cr at Palisade	4	14	29
Rock Cr nr Battle Mountain	7	50	14

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[28] HCI, 1999, pag 37.

[29] We agree with the use of the mean October flow as baseflow because it occurs after the irrigation season. The modeler should analyze the October daily flows for outliers in that local runoff could artifiCIRlly increase the average. Perhaps, the dominant cluster mode analysis should be applied to the daily flows to obtain a better estimate of the October flow.

[30] Based on analyses in HCI, 1999, Appendix B.

Responses

Crundwell (1986) examined several types of climates in his study including a steppe. Additionally, there have been studies conducted in northern Utah and northern Colorado that yield similar evapotranspiration rates to those used in the Carlin Trend model. Christiansen (1970) cites a study performed by the U.S. Bureau of Reclamation where evapotranspiration values for cattails were estimated to be 60.42 inches per year. Parshall (1937) reported evapotranspiration losses for cattails growing in soil tanks at an experimental station at Fort Collins, Colorado to be 52.5 to 77 inches per year. He noted that evapotranspiration losses under actual conditions could be less. The evapotranspiration values cited in these studies with climates similar to the hydrologic study area are in the same range as the 54.4 inches per year used in the Carlin Trend Model.

Surface Water and Spring Flow

The average flow rates shown in the table are the average baseflow rates (i.e., flow rates during the month of October), when flow is historically low. In some (wet) years the impact of the dewatering may be much less than stated, in some (dry) years the impact of the dewatering may be more. Thus, it is considered correct to use the average base flow to estimate the impacts of dewatering.

Lower Maggie Creek has frequently dried up during the fall in dry years, before and during mining operations. While Gold quarry dewatering may add to the frequency of Upper Maggie Creek drying up, this would not be a new occurrence.

Although Carlin Spring is located within the Marys Creek hydrographic basin, most of its flow is derived from the Maggie Creek hydrographic basin. Carlin Spring is located at the western margin of a volcanic flow that is interbedded within the Carlin Formation at shallow depth. Most of this interbedded unit occurs to the east, beneath Maggie Creek. This area of Maggie Creek is a losing reach, which provides recharge to the volcanic unit and Carlin Spring.

Comments

From 10 to 30 percent of the time the actual flow in the stream or river is so far below the average that it is not considered as a part of the average. During these years, the impacts due to dewatering will be much greater than the average.

Carlin Spring is also a concern. It is the primary source of water to Mary's Creek which is also the water supply for Carlin. Because of fault blocking, the model predicts very little impact to this spring. The report should document the source of water to the spring. The baseflow from the spring exceeds the predicted recharge[31]. The extra flow comes from somewhere and the document should address this. NGC should perform geochemical analysis to determine its source formation.

19-61

Grid Size: The grid layout of the Carlin Trend model is very complicated. In general, numerical problems will be decreased if standard shaped elements and transitions between sizes are used. SNL found errors in the large grid sizes which are used over 70% of the CT model, but they did not address transitions. Anderson and Woessner (1992, pages 67-68, italics in original, emphases added) state:

> In designing a finite element grid for isotropic materials, each element should be constructed so that its *aspect ratio* (the ratio of maximum to minimum element dimensions) is **close to unity**. This requirement is similar to the factor of 1.5 used in expanding finite difference grids and is **necessary to minimize numerical errors**. For example, numerical errors can be minimized by exclusive use of equilateral triangular elements. **Experience has shown that aspect ratios greater than five should be avoided**. Furthermore, a **transition region** should be used to **change element sizes gradually**... When dealing with anisotropic materials, the shape of the elements should be considered in the equivalent transformed isotropic domain and designed so that the aspect ratio in the isotropic domain does not exceed five.

The Carlin Trend finite element mesh (HCI, 1999, Figure 8) decreases from dimensions of two miles or more to less than a quarter mile in just two miles. This occurs in the transitions from the Susie and Maggie Creek areas to the Post/Betze and Gold Quarry areas. It also occurs from the Rock Creek and Willow Creek valley areas to the north end of the Post/Betze area. These are not "gradual" transitions. Additionally, there are many elements with aspect ratios exceeding 5. Particular problems occur with the modeling of faults which are simply long, narrow elements with very low conductivity adjacent to regular elements with higher conductivity.

HCI should change the element shape so as not to be irregular potentially resulting in numerical problems or prove that numerical problems do not exist. They could do this by performing water balances for small areas around the rapid transition zones and showing that the error is less than a few percent. The experience of this reviewer with finite difference models is that numerical difficulties often manifest as localized water balance problems even in models that overall are well calibrated. To justify the use of this grid, HCI should consider the water balance for specific regions of the model where there are rapid transitions or strangely shaped elements. This is very important near the faults which are model as regular elements with low conductivity. These may cause complex water balance problems that must be discussed in their report.

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[31] HCI, 1999, page 42. "Baseflow from the ground-water system amounts to approximately 2.7 cfs." Table 1 shows recharge in the "Marys Creek Area" is 2 cfs.

Responses

Grid Size

Great Basin Mine Watch points about the finite element grid are incorrect, for an ideal grid. The complicated grid is probably more the result of the model's original outgrowth from the Gold Quarry Model and evolution with additional information, rather than lack of good design techniques. The highly irregular-shaped elements, however, are in the minority, and most of these elements are used to define faults, which represent a small percentage of the model domain. There are some areas of grid cell size variations that are not very gradual, but there *are* transitional elements, and these areas also represent small percentages of the model domain. There are many examples of grids with irregular elements, including high aspect ratios locally for faults, in Anderson and Woessner (1992). Mathematical errors resulting from deviations from an ideal grid are insignificant relative to the level of accuracy expected from such a large regional model; however, it is only a potential problem where hydraulic gradients are steep (i.e., near the center of dewatering).

Comments

Calibration

19-61 Calibration is the attempt of the modeler to adjust a models parameters so that the model simulations resemble the observed reality. In groundwater, it is typical to compare water levels and fluxes. Note that we agree with the statement that it is more important to simulate water level changes than exact water levels[32]. This is especially true in the transient calibration.

Steady State: The steady state calibration has improved from the first version of this model that CSPP reviewed during 1999. The original version had residuals exceeding 600 feet. The current calibration has decreased the residuals to less than 200 feet. The statistics of the calibration are reasonably good except that the mean absolute error is 32.8 feet. Also, stating the percentage that the highest absolute residual is of the range of measured heads is misleading. The true error range is the difference of the biggest negative and positive residuals. From -166 to 139, the range is 305 feet and the percent that that range is of the range in measured heads is 13.9%.

Several trends can be observed. The first is that the highest negative and positive residuals occur in wells east of the Betze-Post mine. Over about 8000 feet, the residual at NA37A (-166.2) increased to NA36D (139.7). As the residual goes from very negative to very positive in a down gradient direction, it suggests that hydraulic conductivity between these wells is modeled to be much lower than observed. This comment is supported by the overall change between NA38, NA37A, B and C and between NA36D and S.

The model overpredicted levels at S4 by 135.6 ft. This suggests either that recharge in the mountains is too high or that the hydraulic conductivity is too low.

HCI claims that "[t]he goal of steady state calibration is to match heads and fluxes by the numerical model to actual conditions"[33]. However, other than a mention of applying recharge as "the long-term average"[34] and predicting flow and ET in the list of "physical limitations, there is no discussion of the simulated fluxes. The reviewer has no idea of how well the model actually simulated the ET in Boulder Flat or the discharges from major springs. There should be a table provided that compares the estimated or measured flows with the simulated fluxes.

This is doubly important because HCI downplays the importance of calibrating for the flux from a spring.

> There is virtually no way to precisely calculate such discharge (spring) and interflows because of the small-scale factors involved and the variation in those factors (e.g., the size of the "outlet" of a spring or the bed conditions of a stream). In a numerical model, the discharge from a spring is numerically distributed across a large area that might not represent the actual area of discharge of a spring.[35]

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[32] HCI, 1999, page 62.

[33] HCI, 1999, page 58.

[34] HCI, 1999, page 59.

[35] HCI, 1999, page 63.

Responses

Calibration

Steady State

The mean absolute error of 32.8 feet is actually relatively small for a regional scale model. The maximum acceptable value of a calibration criterion depends on the magnitude of the change in heads over the problem domain. Comparing the range of error, however, to the range in measured heads is also misleading. Comparison of some average measure of error to the range of measured heads is more meaningful. If the ratio of the root mean squared (RMS) to the total head loss in the system is small, the errors are only a small part of the overall model response (Anderson and Woessner 1992). This ratio is only 2.3 percent.

There are some areas where calibration residuals are less desirable than others, in some cases due to measured water levels that have low reliability, but these areas are relatively insignificant with respect to the regional scale of the model and the objectives of its use. Detailed modeling in the Betze/Post Mine area, for example, would be expected to result in improved residuals in the area highlighted by Great Basin Mine Watch. Detailed modeling, however, is not an objective of regional modeling.

Recharge was applied and distributed to the model as calculated with the Maxey-Eakin method, and as such, was not a calibration variable.

Table 7 and page 55 of HCI's model report address simulated versus measured gains and losses along the Humboldt River, and Table 4 compares simulated and measured streamflows in major tributaries. The Carlin Spring contributes essentially all the water flow in Mary's Creek. The simulated streamflow for Mary's Creek is similar to the estimate of streamflow.

The major springs within the hydrologic study area were simulated, an acceptable approach for a regional model. The discharge at Carlin and Niagara Springs was simulated with the RIVERS subroutine. The model, therefore, uses a boundary condition for springs that incorporate a conductance term.

The simulated discharge at Sand Dune, Green, and Knob springs appears to be supported by an adequate explanation of the differences between estimated and simulated flows. The cause for the discrepancy is subjective, and Great Basin Mine Watch is not necessarily correct. In fact, modeled water levels are actually slightly lower than measured water levels in this area, indicating that the storage coefficient is not too low.

Comments

19-61 Calibrating for spring flow is not problem in MODFLOW. Using a drain boundary, the modeler can calibrate for spring flow by adjusting the conductance. Just because HCI chooses to use proprietary model that apparently is not as flexible as MODFLOW, they should not be dismissed from modeling this important flux. They further downplay the importance of modeling springs. "Furthermore, the reported flows of springs and minor streams are often highly variable, making calibration targets questionable."[36] The typical method is to calibrate to an average flux. This is why it is important to present the water balance for the steady state calibration; it allows the reviewer to consider whether the model is reasonable. Even though we agree with their statement that comparing changes in discharges to a simulated baseline[37] is reasonable, it is not possible to determine the reasonableness of this model without knowing whether they have even simulated an appropriate magnitude. For example, if the average discharge from spring is 0.25 cfs, it is probably reasonable to simulate the flow from 0.15 to 0.4 cfs.

HCI does suggest that modeling of the spring discharges in Boulder Flat is accurate and has an acceptable precision. "During the transient calibration, discharge from the three springs was simulated and compared to reported flow values... There is a good correlation between simulated and measured flows in early time. The discrepancy in later time is probably due to increased storage and evapotranspiration losses as wetlands developed and expanded."[38] We disagree. Figure 18 shows the computed values significantly overestimate the measured spring flow during calibration. HCI should adjust the parameters in their drain modeling routine to limit the flow. This is important because of how it affects the local water balance. Water levels in the area were simulated reasonably well; the fact that the model discharges too much water from the springs indicates that the storage coefficients for the region are probably wrong. In this case, the specific yield is probably underestimated because the aquifer can hold less water for a unit change in water level.

Transient Calibration: HCI completes its transient calibration with comparisons solely of head level changes with no consideration given to fluxes. Because the transient simulation includes 8 years of dewatering pumping, the reviewer would benefit from a discussion of whether and the amount of any induced fluxes on any boundaries, including the rivers.

The transient calibrations in the carbonate aquifer near the Gold Quarry mine shows changes in observations that are not simulated in the model. In some cases, such as GQP-45 and GQP-40, the rate of observed change fluctuates causing both negative and positive residuals at differing times in the analysis. Observed conditions in the well responds quicker to changes than the model simulation. This is likely due to the karst nature of the aquifer; as a solution chamber or pathway is dewatered, levels in the area quickly drop (or recover). The model treats the aquifer more as a porous media which does not respond as quickly.

The few observation in the siliclastic do not change as fast, probably because it is a porous media. The rapid simulated change in well T-1 suggests that stress propagates to the northwest faster than in the actual aquifer. It raises the question of whether the model accurately simulates dewatering from each aquifer.

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[36] Id.

[37] Id.

[38] HCI, 1999, page 56.

Responses

Transient Calibration

The transient calibration of the groundwater model is an acceptable approximation of actual conditions. It should also be considered that the groundwater model was compared with a different model prepared for Barrick, and the groundwater model showed greater impacts than the other model. Even though the model may not be perfect, it is a reasonable tool to predict impacts.

Monitoring well WW-6 is not one of only two wells in the model that are screened in the Carlin Formation. Wells GQP-57, NS-2A, NS-3C, SC-1, SC-2, G-66, MYC-1, MYC-2, MYC-4, MG-1, MG-2, MG-3, MG-4, USGS-3, USGS-4, USGS-5, NMC-2, SIC-1, CV-10, MK-1, MK-2, PCHEM, MAG-A, MAG-B, MAG-C, MAG-D, JKC-1, JKC-3, JKC-4, COY-1, COY-2, and WW-9 are also screened in the Carlin Formation or alluvium. Well WW-6 is located next to a potable water supply well, which pumps a relatively small volume of water. Pumping from the potable water well is responsible for the variation in head observed at WW-6. Originally the pumping stress from the potable water well was not included in the model calibration. Recently that stress was added to the latest calibration of the model and the variation in head at WW-6 was replicated. The small additional stress did not change predicted pumping rates at the Gold Quarry mine and did not change the size of the predicted maximum 10-ft drawdown isopleth.

Comments

19-61

HCI should include discussion of which aquifers (geologic media) are dewatered at what rates. This should be compared to the rates simulated in the model. Thus, we ask for a table of actual dewatering and model dewatering by geologic formation. The different dewatering responses in different formations suggest that the model may not be accurately simulating the dewatering withdrawals.

The response of well WW-6 is troubling. The observed values show significant changes in the Carlin formation. Levels have dropped several tens of feet. The simulation shows a flat line which means that stress has not yet reached the Carlin formation. It is one of only two wells in the Carlin formation. The model effectively isolates the formation from dewatering with a basal clay layer; this well shows that impacts are actually occurring and the model is not simulating them.

The model fails to simulate observed changes in the carbonate in the Marys Mountain Area in GQP-51. The response in GQP-49, upgradient from GQP-51, suggests the simulated stress has not reached the area while the actual stress has. However, that GQP-32A has not changed at all while the model simulates a change indicates there are more aquifer layers than modeled.

The siliclastic well, ML-9, shows a substantial change in observed in late 1996 that is not observed in the model. It indicates that stresses can move very quickly suggesting that impacts to certain portions of the aquifer could occur quickly.

Transient calibration shows clearly that the model does not propogate stresses as fast as has been observed. But the lack of observed or simulated changes in many wells indicates a larger problem; much of the model domain has not been stressed. Future simulations will depend on conditions calibrated in an area that have never been stressed and for which there is actually very little knowledge of how they will respond.

Because the heads are poorly calibrated and the water balance is not even provided, the solution provided is clearly not unique. It also indicates that a significant uncertainty exists in any model predictions.

Predictive Simulations

Pit Lake Infilling: The document should provide discussion about which aquifer layers yield water to the forming pit lakes (Dee, Bootstrap, Tar,Post/Betze, Genesis, and Gold Quarry)[39]. Combined with a table regarding dewatering requested above, this would show whether the pit lake water comes from the same layers as removed from the model. It would also provide information on the source of water for the pit lake.

Also, it is essential to show the rate that the model simulates pit lake formation at all of the mines. How do these simulaitons compare with previous estimates? How does the estimate for Betze-Post compare with the model prepared by MacDonald and AssoCIRtes? Because these lakes are major deficits in the model, it is essential that they be accurately simulated if the recovery of the drawdown is to be accurate. Section 4.10 provides a completely unsatisfactory description.

Sensitivity Analysis: HCI presents a sensitivity analysis where it alters individually various aquifer units by 0.1 or 10 times the calibrated value. In some cases, this leads to a very significant differences in water

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[39] HCI, 1999, page 59.

Responses

Predictive Simulations

The required information about which aquifers yield water to the pit lakes is contained in Geomega (1997). Recharge has been applied as is customary in current groundwater models.

Comments

levels. For example, decreasing the hydraulic conductivity to 0.1Kh in the high conductivity carbonate unit changes the drawdown by up to 200 feet[40]. The presented results for vertical conductivity show very little sensitivity[41]. However, it would be useful to analyze the sensitivity in the surface alluvial layers. Similar comments apply to the sensitivity to changes in specific yield.

Importantly, the model is very sensitive to recharge rate, especially at the Gold Quarry mine. This is important because the method of modeling recharge in the HCI model is questionable. Questionable because it follows the Maxey_Eakin methodology by recharging at the point that precipitation or snowmelt occurs. Much of the recharge in a basin may actually occur in stream beds after precipitation or snowmelt runsoff. The amounts could be correct in the model, but the location could be significantly wrong. How this affects the predictions depends on the aquifer units into which the recharge actually occurs. Recharge at high elevations in the mountains would follow a long flow path to the deeper bedrock aquifers and finally to the pits. Recharge at low elevations, say where the streams discharge from the mountains, would provide a better source to the streams. This could be important if pit lake creation begins to take water from the rivers and streams. **19-61**

Summary

All predictions made with the HCI model are very uncertain. All aspects of the model, from the location ofthe boundaries to the basal clay layer to the uncertainties around the calibration lead one to believe that the model is very uncertain. BLM managers and the public are led to believe that the massive predictions of drawdown and drying streams and rivers are precise. Because a calibration tends toward the mean solution of the model, the chance that the drawdown extent or the river fluxes will exceed the predicted values equals the chance that it will be less than the prediction. In our opinion, because the boundaries limit the drawdown as can be seen in the way the maximum ten-foot drawdown resembles the domain boundary, it is more likely that the model underpredicts than overpredicts the impacts.

References

Anderson, M.P, and W.W. Woessner, 1992. Applied Groundwater Modeling: Simulation of Flow and Advective Transport. Academic Press, San Diego.

Hydrologic Consultants, Inc. (HCI), 1999.

Plume, R.W., 1995. Water Resources and Potential Effects of Ground-Water Development in Maggie, Marys, and Susie Creek Basins, Elko and Eureka Counties, Nevada. U.S. Geological survey Water-Resource Investigations Report 94-4222. Carson City, NV

Responses

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[40] HCI, 1999, Figure 22A.

[41] HCI, 1999, Figure 22B.

Attachment 2

Memorandum Report by Mr. Jim Kuipers

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"Technical Support for Grassroots Public Interest Groups"

April 29, 2002

To: Tom Myers, Great Basin Mine Watch

From: Jim Kuipers, Consulting Mining Engineer, and CSP2

Re: **Comments on Leeville Project Draft Environmental Impact Statement**

The following comments on the Leeville Project Draft Environmental Impact Statement (DEIS) were prepared at your request on behalf of Great Basin Mine Watch. The comments are based on our extensive technical knowledge pertaining to hardrock mining environmental and reclamation and closure matters.

ARD Potential

19-62 The DEIS clearly identifies significant acid drainage potential from at least some portions of the waste rock that will be disposed of on site. In mitigating the acid drainage potential the DEIS relies heavily on the premise that *the combination of potentially acid-producing rock with other non-acid producing rock is expected (underline added) to result in a net acid-neutralizing waste rock disposal facility* (DEIS p. S-2). The same presumption is described in the DEIS as the basis for Newmont's Refractory Ore Stockpile and Waste Rock Dump Design, Construction, and Monitoring Plan.

19-63 The premise relied on in the DEIS to mitigate acid drainage does not bear scrutiny when analyzed by the scientific method. It relies on the hypothesis that if potentially acid-producing rock is placed with non-acid producing rock acid any acid drainage will be neutralized. However, experience has shown at other hardrock mining sites administered by the Bureau of Land Management and other federal agencies and state agencies, such as the Golden Sunlight Mine and Zortman and Landusky Mines in Montana that neutralization in many cases does not occur as predicted and acid drainage ensues. Experience has shown that general guidelines such as 3:1 acid base accounting (ABA) ratios, placement with non-acid producing rock, and other measures are insufficient to either predict or mitigate acid drainage. The evidence to date would suggest that some rock types in practice can produce acid drainage at even higher ABA ratios than 3:1, in many cases the location specific generation of acid exceeds the available contact area of any surrounding neutralizing materials, and in order to utilize the available neutralizing potential near perfect blending or mixing would have to occur, which is infeasible in most mining operations and

Response 19-62

Comment noted.

Response 19-63

See Responses 1-7, 1-8, 1-9, and 1-10.

The Leeville Project would not rely solely on blending of rock to manage leachate production and quality. An engineered facility (encapsulation) would be used to control infiltration and leachate production, in addition to the blending and neutralization that would result from run-of-mine waste rock placement (see **Errata** in Chapter 3 of this Final EIS). Operational verification of geochemical conditions would allow Newmont to test for changes in acid generation potential and to address any changes through its Corporate Waste Rock

The scientifically supportable hypothesis that the combination of potentially acid-producing rock with acid neutralizing rock could result in a net-acid generating facility was the working hypothesis tested by Newmont. The acid rock drainage evaluation presented in the DEIS is based on the hypothesis that sulfide oxidation could result in production of acid conditions during weathering of some rocks mined at Leeville, and that available neutralization potential in these rocks would to some degree neutralize produced acid. This hypothesis was tested in 945 samples of waste rock and ore by measuring the maximum potential acid generation and neutralizing potential using Leco methods, and through acid base account testing of 15 composite samples of waste rock and ore.

With the exception of the WLW2, FCW1, TW2, and TW3 units, AGP data indicate that both on a run-of-mine basis and within each lithological unit, ANP/AGP values for Leeville waste rock are consistently above the regulatory criterion of NPR 3:1. Units WLW2, FCW1, TW2, and TW3 are potentially acid generating but represent 11.4 percent of the total waste rock inventory. The NCV and ABA analyses concluded that the units comprising the majority of the waste rock (88.6 percent) have potential to neutralize acid. The net NNP was 141 tons $CaCO_3$/kton and the net NPR (ratio of ANP/AGP) was 13, based on ABA analyses of the composites studied in MWMP analyses. Similar analysis of the individual 725 samples that were incorporated into the composites shows a weighted, run-of-mine NNP of 11 tons $CaCO_3$/kton and an NPR of 5.1 based on median ANP and AGP values for each lithology, with an NNP of 13 tons $CaCO_3$/kton and an NPR of 5.6 for the mean case. These values show that the rocks to be mined at Leeville exceed pertinent NPR regulatory criterion of 3:1.

BLM acknowledges that both the Golden Sunlight and Zortman and Landusky mines have acid generation occurring in some locations. BLM also recognizes that rocks from those mine sites differ significantly from those to be mined at Leeville, that the Golden Sunlight and Zortman and Landusky mines are located in different climate conditions, and both mines have been operated under different plans of operation than those proposed by Newmont for the Leeville Project.

Comments

19-63 at run-of-mine particle sizes. Therefore, the only scientifically supportable hypothesis is that the combination of potentially acid-producing rock may result in a net acid-producing facility.

Responses

It is also the case that the rock to be mined at Leeville has very different geochemistry than that observed at Golden Sunlight and Zortman and Landusky mines. Neither of these deposits exhibit Carlin-type mineralization and neither have the quantities of carbonate rock associated with waste rock that occur at the Leeville Project site. Few if any of the rocks at Golden Sunlight Mine are net neutralizing. Data summarized in Table I-1 on p. I-3 of the Golden Sunlight Mine DEIS (MDEQ and BLM 1997) show that in all cases, waste rock from Golden Sunlight Mine has an NPR ratio of less than one. The Golden Sunlight Mine DEIS states that *"none of the rock types at the Golden Sunlight mine can be considered risk free with respect to generation of ARD; all material has a moderate to high risk of forming ARD. In fact, all waste rock types are net-acid generators [based on comparisons of NNP values and NPR ratios]…"*. For the most part, the same can be said for the Zortman and Landusky Mine rocks, which also exhibit low neutralization potential. Data presented in Table 3.2-8A of the Zortman and Landusky Mines DEIS (MDEQ and BLM 1995) show that, with the exception of the amphibolite gneiss (which represents less than 7 percent of the Zortman waste rock) and the Emerson Shale (representing less than 20 percent of the Landusky waste rock), most lithologies have moderate to strong potential to generate acid, with NPR ratios equal to or less than 1. The run-of-mine NNP at Zortman is -21.2 tons $CaCO_3$/kton, and at Golden Sunlight is less than -48 tons $CaCO_3$/kton. By comparison, the run-of-mine NNP for Leeville is 13.5 tons $CaCO_3$/kton.

These results do not guarantee that oxidation would not occur at Leeville, but they do indicate that most generated acidity would be neutralized. The mining production sequence proposed at the Leeville Project would result in mixing of waste rock mined from three ore deposits; W. Leeville, Four Corners, and Turf. Because PAG rock associated with each deposit is a minor fraction of each deposit, run-of-mine waste rock blending is expected to achieve a high level of mixing that would minimize potential formation of localized "hot spots". During periods of production in PAG zones, Newmont has committed to selective handling and encapsulation of reactive rock in PAG cells constructed in the waste rock disposal facility. Newmont has also adopted an engineering management plan involving placement of waste rock on a compacted pad with use of a water balance cover to reduce oxidation that may occur, promote slow rates of unsaturated flow that optimize neutralization reactions, and reduce formation of preferential, channelized flow. In addition, placement of waste rock on a low permeability pad would enable Newmont to collect seepage that might be produced.

The reviewer's suggestion that Leeville Project data should be evaluated using data from other mines developed in different ore deposits and lithologies, each with its unique suite of mineralization, alteration, and oxidation, and each with site-specific operational practices to manage facilities designed to address very different climate conditions, is not scientifically supportable. If suitable data from mines developed in Nevada with similar operating practices and site-specific conditions are available, comparison of that data with Leeville Project data would be meaningful. For example, the comprehensive analysis for the Twin Creeks Mine in Nevada indicates very little potential for seepage to impact groundwater from a waste rock with 8 percent (defined as NNP < 0) PAG placed on an alluvial pad (Kempton et al. 1997).

Methods of PAG identification and operational measures to ensure adequate blending and appropriate handing at Leeville have been provided in Newmont's Corporate Waste Rock Management Plan, 1995, modified to include performance standards and detailed construction specifications. See Leeville Project Mitigation Plan.

Comments

19-64 **Recommendation:** The DEIS should re-examine the available data for the Leeville project based on experience and information gathered at other projects by BLM in Montana and other states in order to ensure that the best available information is used to assess the likelihood of acid generation and the potential for the proposed mitigation measures to ensure long-term protection of the environment. The means that would be used to ensure adequate identification and mixing in order to implement mitigation measures should be more adequately described and required.

Waste Rock Storage

According to the DEIS *in cases where acid-base accounting (ABA) indicates the total mixture of waste rock is acid-generating, waste rock would be placed on a base constructed of compacted, low permeability materials, designed to prevent vertical migration of fluids... a low permeability cap would be constructed on the final lift of the PAG cell. The cap would be constructed of random wheel compacted clay or alluvium to provide a barrier to fluid migration.*

19-65 The proposed measures rely on the used of compacted locally available materials, to prevent vertical migration. Based on experience, while it may be possible to reduce vertical migration with such measures, a more typical engineering designed cover is necessary if the objective is to eliminate or prevent vertical migration. While compacted clay or alluvium is commonly used as a part of engineered design covers, those materials by themselves exhibit properties that cannot ensure that they alone will prevent fluid migration. Factors such as material homogeneity, consistency, placement and compaction lead to inconsistencies in its effectiveness, and it can be disrupted by disturbances such as compaction and settling. The materials on top of the pile will be subject to freeze/thaw cycling which can lead to desiccation and cracking of the layer.

It has been established at other mine sites administered by the BLM in other states that in the presence of acid drainage generating materials additional source control measures are typically considered necessary in order to ensure against undue and unnecessary degradation and to provide long-term protection to the environment. Engineered covers based on either water balance or water barrier approaches are typically specified in similar conditions as those described at Leeville and elsewhere where Newmont's plans are presently in use. Based on experience, Newmont's plans do not provide long-term prevention of acid drainage from occurring or migrating to ground water and/or surface water.

Recommendation: The use of compacted clay or alluvial materials in the prevention of fluid infiltration and capture of acid drainage should be reconsidered based on the experience of BLM and other federal and state agencies with respect to the effectiveness of such materials to eliminate or prevent infiltration or to affect capture of solutions. The use of engineered covers employing water balance or water barrier principles should be considered as an alternative to the approach used in Newmont's plans. The performance criteria (% of precipitation intended to infiltrate, or percent of drainage intended to be captured) should be specified in the plans.

Native American Religious Concerns

19-66 As a part of my technical endeavors and because of my personal background I have endeared to understand Native American concerns from the standpoint of their application to the federal and state regulatory processes. The DEIS makes the unsupported statement that *Implementation of the Proposed Action and Alternatives would have no direct or indirect impacts on Newe/Western Shoshone traditional cultural values, practices, properties, or human remains.*

This incorrect statement shows the BLM's inability to understand or appreciate Native American issues. If they were to understand or even respect the religious beliefs of the Newe/Western Shoshone people they would acknowledge that mining activity such as that described in the Leeville DEIS is in direct contradiction to the religious principles of the Newe/Western Shoshone people. This demonstrates the BLM's disregard for the level of cultural understanding and appreciation that is not evident and must occur before they can adequately discharge their legally required trust responsibilities to the Native American people who are affected by their actions. I fail to make a constructive recommendation as it is my conclusion that the BLM is incapable of carrying out their legally mandated trust responsibilities in this regard.

Responses

Response 19-64

Comment noted.

Response 19-65

See Response 1-7 and Response 19-63.

Response 19-66

See Response 19-56.

Comments

Groundwater Control and Grouting

According to the DEIS (p. 2-15), *the concrete shaft liner installed in each shaft would be designed to prevent seepage into the shafts.* Also (DEIS (p. 2-19). *Should groundwater inflow to shafts occur during construction in volumes that impeded shaft sinking activity, pressure grouting techniques would be used in the upper plate rocks to seal fractures and reduce inflow. This technique may be used if excessive groundwater inflows are encountered during underground development and mining.*

However, elsewhere in the DEIS (p. 2-46) it states that *BLM has determined that a site-wide grouting program is not a reasonable alternative for the proposed Leeville Project. State-of-practice drilling and grouting technologies are such that accurate placement of grout at the desired locations would not be possible. In addition, the grout curtain could be jeopardized by stresses induced by normal mining practices and seismic activity. This would result in an unacceptable degree of risk to human safety (Herbert 1998).*

19-67

The referenced report was also reviewed and considered together with my knowledge of grouting procedures that have been effectively utilized to control groundwater flow at mines such as the Stillwater and East Boulder projects in Montana and elsewhere. Grouting has been proven to be a technical and cost-effective solution in many cases to groundwater inflow concerns, and is currently widely used at various locations in the hardrock underground mining industry.

Herbert's report is more of an overview with some site-specific consideration of the Leeville Project, and is not a comprehensive or conclusive analysis typically performed for a feasibility study level evaluation (the term pre-feasibility study would be more appropriate for the evaluation performed). However, the report does point out that there are both pros and cons for grouting, and does make the conclusion that *grouting could be considered as a possible method of controlling groundwater on a regional scale where the entire stratigraphic sequence is considered and specific concerns could be addressed.*

The report identifies conditions where grouting can be considered to more or less effective or appropriate, and provides a cursory comparison of those conditions to those at the Leeville project. It should be noted that the report concludes that *in my opinion…grouting as a means of controlling water in mining operations is a feasible method* and *it should be performed on a regional scale working with all of the mines within the trend rather than one isolated operation.* Herbert's conclusion that grouting on the Leeville project is not advisable is based in his words on *an unknown degree of risk to human safety and an unknown degree of long-term effectiveness in controlling groundwater.*

Recommendation: One of the purposes of an environmental impact analysis is to determine the degree to which any measure might affect human safety and ensure long-term effectiveness. The Leeville DEIS assumes that the least favorable result occurs with respect to "unknown" degrees of risk or effectiveness, rather than making any meaningful evaluation of those degrees of risk or effectiveness. The DEIS should undertake to more adequately evaluate the effectiveness of grouting at Leeville and should incorporate Herbert's recommendation that grouting on a regional scale, including such as the Gold Quarry mine, should also be considered. The serious and pervasive nature of the groundwater withdrawal and subsequent surface water and wetlands impacts that will result from such actions warrants a much more extensive analysis of this and connected actions in this regard.

Responses

Response 19-67

See Response 1-2 and Response 1-3.

Letter 20

Thom and Jette Seal
P.O. Box 6415
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April 29, 2002

Deb McFarlane
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Comment on the Draft Leeville EIS

This letter and comment is in **support** of the "Proposed Action" outlined in the submitted plan of operations for the Leeville Project.

Alternative A – is unsubstantiated and unnecessary, causing increase in costs with negligible returns.

Alternative B – Backfilling the shafts are also unnecessary. Concrete strengthens with age and the concrete cap is a sound engineering approach to closure.

20-1 Alternative C. – Relocation of the waste stockpile to Sec 3, is not a good idea. Not only would it cost more, due to transportation costs, but PAG waste at Sec 3, which is not designed for closure of PAG wastes, would require additional design, permitting and additional room, which is now being used for ore storage not PAG waste for closure.

We ask the BLM to follow The US Congress's Laws regarding Mining.

The Mining and Minerals Policy Act of 1970 states: "The Congress declares that it is the continuing policy of the Federal Government in the national interest to foster and ***encourage*** private enterprise in (1) the development of economically sound and stable domestic mining, minerals, metal and mineral reclamation industries."

Thank You

Thom Seal

Thom and Jette Seal

Responses

Response 20-1

Comment noted.

CHAPTER 5

REFERENCES

References cited in Chapter 4 of this FEIS (Comments and Responses) that were *not* included in the DEIS are listed below:

Anderson, M. and W. Woessner. 1992. Applied groundwater modeling – simulation of flow and advective transport. Academic Press. New York.

Bureau of Land Management (BLM), U.S. Department of the Interior. 1997. Draft Environmental Impact Statement Golden Sunlight Mine. Butte District. Butte, Montana.

_______**2002.** Final Environmental Impact Statement Newmont Mining Corporation's South Operations Area Project Amendment. Elko Field Office. Elko, Nevada. April.

Bureau of Land Management (BLM), U.S. Department of the Interior and State of Montana, Department of Environmental Quality. 1995. Draft Environmental Impact Statement Zortman and Landusky Mines.

Crundwell, M. 1986. A review of hydrophyte evapotranspiration. Review of Tropical Hydrobiology. Volume 19, No. 3-4.

Dylla, A., Stuart, D. and D. Michener. 1972. Water use studies on forage grasses in northern Nevada. Agricultural Experiment Station. University of Nevada-Reno and U.S. Department of Agriculture, Agricultural Research Service. T-10.

Feltis, R. and D. Litke. 1987. Appraisal of Water Resources of the Boulder and Stillwater River Basins, Including the Stillwater Complex, South-Central Montana. Montana Bureau of Mines and Geology. Memoir 60.

Geomega. 1997. The Characterization of Pit Lake Water Quality for the Proposed South Operations Area Project Amendment, Eureka County, Nevada. Prepared for U.S. Department of the Interior. Bureau of Land Management.

Kempton, J., D. Swanson, M. Bennett, R. MacDonald, and W. Locke 1997. Application of Probabilistic Acid/Base Accounting to Minimize Waste-Rock Handling in Semi-arid Climates. *In:* Proceedings of the Fourth International Conference on Acid Rock Drainage. Volume 2, pages 873-888.

Newmont Mining Corporation (Newmont). 2002a. Revised Plan of Operations for the Leeville Project. Submitted to Bureau of Land Management. Elko Field Office. Elko, Nevada. April.

_______**2002b.** Maggie Creek Basin Monitoring Plan. Second Quarter 2002 Report. June.

Parshall, R. 1937. Laboratory Measurement of Evapotranspiration Losses: *Journal of Forestry.* Volume 35. No. 11.

Pettit, P. 2002. Personal communication. Hydrology Manager, Newmont Mining Corporation. Carlin, Nevada.

Phillips Mining, Geotechnical & Grouting, Inc. 1997. Preliminary Design of Water Control Measures Required for Sinking the Production Shaft. Report prepared for Newmont Gold Company. September.

Radian International, LLC and Baker Consultants, Inc. 1997a. Hydrogeochemical Conceptual Model, Betze-Screamer Pit Lake Modeling Project. Salt Lake City. Utah.

______ **1997b.** Predicted Water Quality in the Betze-Screamer Pit Lake – Appendices. Salt Lake City. Utah.

Robinson, T. 1970. Evapotranspiration by woody phreatophytes in the Humboldt River Valley near Winnemucca, Nevada. U.S. Geological Survey Professional Paper 491-D.

Seiler, R. and P. Tuttle. 1996. Field verification study of water quality, bottom sediment, and biota associated with irrigation drainage in and near Humboldt Wildlife Management Area, Churchill and Pershing Counties, Nevada. 1996. U.S. Geological Survey Open-file Report 97-586.

Weimer, R. 2002. Personnel communication. Environmental Coordinator, Stillwater Mining Company. Nye, Montana.

Zahn, J. 2002. Personnel communication. Environmental Coordinator, Barrick Goldstrike Mines. Elko, Nevada.

APPENDIX A

Leeville Project Mitigation Plan

NEWMONT MINING CORPORATION'S LEEVILLE PROJECT MITIGATION PLAN

Introduction

In the Draft Environmental Impact Statement for Newmont Gold Company's Leeville Project, the Bureau of Land Management (BLM) provided detailed analysis of the potential impacts associated with implementation of Newmont's proposed Plan of Operations. The BLM also developed for public review and comment a general array of possible mitigation and monitoring measures for each potentially affected resource.

This Mitigation Plan provides the next step in the process set forth by the National Environmental Policy Act (NEPA) by defining a detailed, specific mitigation plan that Newmont commits to undertake upon issuance of the Record of Decision. The Leeville Project Mitigation Plan is a project specific extension of the South Operations Area Project (SOAP) Mitigation Plan (1993) as amended by the South Operations Area Project Amendment (SOAPA) Mitigation Plan (2002) in addressing dewatering and dewatering related impacts.

Geology and Minerals

A. SUMMARY OF POTENTIAL IMPACTS

Waste Rock Disposal Facility

Static geochemical acid-base accounting test results indicate that a small percentage of ore and waste rock is potentially acid generating. Meteoric Water Mobility Procedure tests indicate that waste rock has the potential of leaching antimony, arsenic, manganese, nickel, selenium, and sulfate.

Sinkholes

There is a small potential that sink holes could develop due to the added dewatering at the Leeville Mine within the existing Carlin Trend cone of depression.

B. GEOLOGY AND MINERALS MITIGATION PROGRAM

Waste Rock Disposal Facility

The waste rock dump disposal facility will be constructed in accordance with Newmont's 1995 *Refractory Ore Stockpile and Waste Rock Dump Design, Construction, and Monitoring Guidelines,* modified to include performance standards and detailed construction specifications. Minimum standards to be followed are described below but modifications to the design to incorporate more stringent standards are acceptable. The base will be constructed to a thickness of 1 foot and will have an hydraulic conductivity of 1×10^{-5} cm/sec or less. The base will be sloped to allow for free draining of fluids. Drainage collection ditches will be constructed so that the hydraulic conductivity is 1×10^{-6} cm/sec or less and collection ponds will be constructed so that the hydraulic conductivity is 1×10^{-7} cm/sec or less. Potentially acid generating material will be isolated as discrete cells within the waste rock dump and will be encapsulated on top, bottom and sides with waste rock that has an ANP:AGP ratio of at least 3:1. The thickness of the encapsulating layers will be a minimum of 10 feet. Actual thickness will be based on the neutralizing capacity of the encapsulating layer and calculated so that if acid were produced it would be neutralized. Any precipitation falling within the base perimeter would flow to the lowest elevation area on the low permeability base. Solution would then be captured in a collection pond(s) for sampling and sediment control. A low permeability cap will be constructed on top of the encapsulation layer over the final lift of the PAG cell. Details of the low permeability cap will be determined after mathematical modeling of the dump has been done and will be submitted as part of the closure plan. NDEP will review and permit the construction specifications, material specifications, and performance criteria for the waste rock disposal facility to ensure that waters of the State of Nevada are not degraded by potential acid rock drainage. NDEP may impose more stringent restrictions. In addition to any design specifications and closure requirements that NDEP may impose, Newmont will ensure that the waste rock disposal facility is capped with a minimum of 24 inches of growth medium and sloped to promote run off of water (free draining), prevent ponding or impounding of water, and prevent erosion. The 24 inches of growth medium may or may not be a part of the low permeability cap which will be added at closure.

Newmont will develop a closure plan, which will be based on appropriate modeling data, for the Waste Rock Disposal Facility. This plan will cover the monitoring provisions and time frames required to detect possible water seepage and mitigation measures should sampling prove that the water is turning acid or sampling and modeling suggest that the water may turn acid in the future. Based on meteoric water mobility tests described in the EIS, water collected in the collection pond, if any, will be tested at a minimum for: pH, antimony, arsenic, cadmium, manganese, nickel, selenium, thallium, sulfate, and total dissolved solids. Should the water exceed maximum contaminant levels, it will be handled according to regulation. Long-term trust funds as described in 43 CFR 3809.552(c) will be established at the time the closure plan is completed, if warranted. Until the long-term closure plan is completed, the Waste Rock Disposal Facility monitoring will be bonded under the reclamation bond for 30 years post mining (2050). The reclamation bond will be reviewed every three years and updated as necessary. Bond amount for this monitoring is currently estimated to be $126,000 but will be finalized in the Record of Decision.

Sinkholes

In the event a sinkhole should develop as a result of dewatering activities at the Leeville Project, Newmont shall, within one week of the discovery of the sinkhole, initiate consultation with BLM with regard to the repair of the sinkhole. Newmont shall undertake repair, which could include but is not limited to backfilling, recontouring, and seeding of the sinkhole as soon as practicable.

Water Quantity and Quality

A. SUMMARY OF POTENTIAL IMPACTS

Leeville dewatering would add to regional groundwater drawdown currently created by dewatering at Barrick's Goldstrike Property and the Gold Quarry Mine. A total of about 360,000 acre-feet of water would be removed by Leeville dewatering during the life-of-mine. Dewatering at Leeville would deepen the cone of depression in the vicinity of Leeville (see Figure 4-2) and would extend the period of recovery of the ground water table by 20 years in an area of the Carlin Trend that has already been affected by dewatering at other mines. This would affect recovery of water levels in potentially impacted water wells and recovery time of reduced flow in potentially impacted streams and 40 potentially impacted springs/seeps. On a cumulative basis, reductions in baseflow resulting from Leeville dewatering are predicted to be 0.1 cfs or less for each of the potentially affected streams (as predicted by HCI model: Maggie, Boulder, Beaver, and Mary's creeks) and the Humboldt River.

Groundwater rights for three stock-watering wells and two mining/milling wells could be impacted by additional drawdown from Leeville dewatering and would lengthen the recovery period by up to 20 years. Several surface water rights are located within the Leeville drawdown area. Leeville dewatering would lengthen the recovery period to surface water by up to 20 years.

B. WATER QUANTITY AND QUALITY MITIGATION PROGRAM

Newmont and Barrick both maintain an extensive network of groundwater monitoring wells and surface water monitoring sites. Newmont reports results of monitoring to the BLM quarterly (The 2002 SOAPA Mitigation Plan changes the requirement to twice annually) in the *Maggie Creek Basin Monitoring Plan.* Monthly piezometer hydrographs will continue to be supplied to BLM. Leeville piezometers and surface water monitoring sites are already part of Newmont's South Operations Area Project monitoring network or will be added to the network. The Leeville network monitoring results will be reported to the BLM twice annually in a clearly marked section of the Maggie Creek Basin Monitoring Plan.

Since Leeville dewatering deepens the existing drawdown cone in the vicinity of the Leeville Mine and prolongs the recovery time of the water table by 20 years, mitigation is linked closely with the mitigation for SOAP/SOAPA. In those locations where the HCI model reports show that Leeville will prolong the recovery period by 20 years, Newmont's SOAP/SOAPA mitigation obligations are extended by 20 years. The 20 year mitigation obligation period may be updated as the Carlin Trend Groundwater Model is recalibrated. In other locations, Leeville dewatering is more closely linked with Barrick's Betze Project mine dewatering due to longer recovery periods. Monitoring for Leeville ground water recovery will correspond to the 100 year post mining maximum extent of the drawdown cone, as is the monitoring scheduled for Betze.

Groundwater Monitoring Plan

During the life of the mine, Newmont will provide the BLM with a groundwater monitoring report twice annually; one report will cover October through March and the second will cover April through September. Leeville Project data will be incorporated into the Maggie Creek Basin Monitoring Plan and clearly identified. Monthly piezometer hydrographs will continue to be supplied to BLM. Comprehensive electronic water level files will be provided to the BLM with the monitoring reports, and at any time requested by the BLM. Recalibration of the MINEDW (Carlin Trend) groundwater model will be completed every two years. The recalibration requirement will terminate upon cessation of Newmont's dewatering activities at SOAPA and the Leeville Project.

Long-term ground and surface water monitoring associated with water level recovery from the dewatering program at the Leeville Project will be conducted to assure that mitigation measures described in the Leeville Mitigation Plan would be carried out, if necessary. BLM will also have the option of field checking network piezometers at any time deemed necessary.

Long Term Monitoring Plan for Leeville

Long term monitoring will be initiated when active dewatering ceases at the end of mining at Leeville. During the first two years of this plan, groundwater elevation monitoring shall be conducted on a quarterly basis. The piezometers included within this plan are shown on Figure 1, Groundwater and Surface Water Monitoring Locations. Surface flow monitoring shall be conducted quarterly; the locations of these sites are also shown on Figure 1. The data collected by this monitoring program will be compiled into an annual report and submitted to BLM. All monitoring data shall also be supplied to BLM whenever requested. Submitted data would be in written or electronic format or both.

At the conclusion of the first two years of monitoring, the monitoring program will be reduced by 50%. BLM will review the data to determine which monitoring sites will be retained. The reduced network will be monitored quarterly for an additional eight years. Annual reports will be prepared and submitted to BLM. Monitoring data shall also be supplied to BLM whenever requested.

After the initial ten years of monitoring, the monitoring network will again be reduced. Figure 2, Long Term Monitoring Network, shows the extent of this network. In addition to the locations shown on Figure 2, BLM will choose five additional piezometers from the remaining groundwater water elevation monitoring network to retain in the final monitoring network. It is estimated that 90% recovery in lower plate rocks at Leeville will occur in the year 2185, other locations may have longer or shorter recovery times.

Monitoring and the need for potential mitigation will continue for 100 years post mining (2120) which is estimated to be the maximum extent of the drawdown cone. Length of time required for monitoring and mitigation will be reviewed during updates of the model and could be revised as the model is refined with additional data. All monitoring data shall be supplied to BLM whenever requested, in addition to the annual reports.

Additional Monitoring

If HDP-12 or JKC-1 should decline by 20 feet in any given year, or by a total decline of 50 feet, Newmont will drill and construct a piezometer in the vicinity of Beaver Creek to monitor for possible groundwater elevation changes. The location will be selected in consultation with the BLM and will become part of the Newmont monitoring network to be monitored and reported under the Maggie Creek Basin Monitor Report format. A decline of the water level in HDP-12 or JKC-1 by 20 feet in any given year, or by a total decline of 50 feet will also trigger the initiation of surface water monitoring of the baseline springs in Beaver Creek and flow in Spring Creek.

Surface Water Monitoring Plan

Newmont will, for a period of five Falls (2002 through 2006), monitor up to four springs once each Fall, between September 21 and December 21, in the Beaver Creek area. This monitoring is intended to develop baseline data that can be used in conjunction with groundwater elevation change data to determine, in the future, if impacts caused by cumulative effects from mine dewatering have impacted the Beaver Creek area. The springs to be monitored are located in sections 19 and 30, T. 37 N., R. 52 E., section 24, T. 37 N., R. 51 E., and section 3, T. 36 N., R. 52 E. near the confluence of Beaver Creek with Maggie Creek. These springs may provide refugium for Lahontan Cutthroat Trout during base flow conditions. A field inspection in the Fall of 2002 with BLM and Newmont personnel will locate the exact monitoring locations for each spring and determine if they have perennial flow. Data collected will include photographs, flow rate, specific conductance, pH and dissolved oxygen. This requirement is subject to permission being granted by the private land owner(s) for access to the springs.

A surface flow monitoring station will be established on the perennial reach of Sheep Creek located in approximately the NE ¼ of Section 21, T. 35 N, and R. 50 E. The data from this new monitoring station will be incorporated into the Maggie Creek Basin Monitoring Plan network. BLM and Newmont personnel will determine the exact location of the monitoring station during a field inspection during the Fall of 2002.

Within one year of the record of decision, Newmont will evaluate existing data for springs near the Leeville Project and report to the BLM on the potential of springs near the Project to be affected by Leeville dewatering. BLM will determine if these springs need to be added to the existing survey(s). If necessary, new data (including tritium) will be collected by Newmont to aid in this determination.

Monitoring of select stream and spring monitoring sites specific to the Leeville Project will be continued until 2120, 100 years post mining. Stream monitoring will be continued at the Coyote-0, LJack-0, Jack-0, and Jack sites. Spring monitoring will be continued at springs 76 and 78. As discussed above, if monitoring of peizometers HDP-12 or JKC-1 show a decline by 20 feet in one year or a total decline of 50 feet, then additional surface flow monitoring will be initiated. This additional surface monitoring will incorporate monitoring the flow in Spring Creek, and the Beaver baseline springs.

A population of spring snails occurs in Warm Spring (40), outside the cumulative effects area. Should the groundwater level in monitoring well PAL-1 fall more than 10 feet from its October 1993 level or if the recalibration of MINEDW model shows a potential impact to this area, Newmont will initiate within fourteen days, consultation with the BLM concerning appropriate further studies and/or mitigation, and Warm Spring (40) will be added to the surface monitoring network.

Spring flow monitoring will be conducted annually, in the fall (9/21 to 12/21). The locations of these sites are also shown on Figure 2. Stream flow data will be collected quarterly. If during the course of dewatering other monitoring sites are added as required by BLM to the Maggie Creek Basin Monitoring Plan network some of these sites may be added to the long term monitoring network and be included in the Gold Quarry Spring Survey Fall Report.

The Leeville project adds up to 20 years to the recovery time of the dewatering impacts within the cumulative cone of depression for dewatering on the Carlin Trend. As monitoring is scaled down at Gold Quarry, if it becomes apparent that certain sites are critical for continued monitoring they may be incorporated into the Leeville monitoring network.

Groundwater and Surface Water Mitigation

Newmont will bond for long term water monitoring. In the eventuality that Newmont is unable to continue ground and surface water monitoring this bond will be secured within 6 months of the signing of the Record of Decision and will cover the long term ground water and surface water monitoring described above. The bond amount is currently estimated to be $875,700, but the amount will be finalized and published in the Record of Decision.

If any existing water rights for livestock are impacted, Newmont will enter into arrangements with existing area ranchers or the BLM in the case of public land, to replace any stockwater loss caused by mine dewatering. Newmont will use its existing underground water rights (or obtain additional well permits) to provide such replacement water.

If any existing water rights for uses other than stockwater are impacted, Newmont will enter into arrangements with the affected party or the BLM in the case of public land, to replace any water loss caused by mine dewatering. Newmont will use its existing underground water rights (or obtain additional well permits) to provide such replacement water.

Seep and Spring Mitigation

Mitigation of lost flows at seeps and springs will be accomplished by two basic mechanisms: replacement of flow or provision of substitute water sources at nearby locations. Where impacted seeps or springs support sizable riparian areas or provide flow to adjacent creeks, replacement of flow will be implemented through the use of groundwater wells drilled at or near the affected spring. Flow replacement will be done such that the primary function of unimpacted spring and seep flow is maintained. Where impacted seeps and springs do not serve those functions, but are important sources of water for terrestrial wildlife, substitute water sources will be provided through the use of guzzlers. In areas where seeps and springs are in close proximity to one another, a single well or guzzler may be utilized to mitigate several impacted water sources.

Mitigation measures will be initiated within sixty days after BLM has determined that mitigation is necessary. The type of mitigation (as described above) best suited to an individual seep or spring will be determined in consultation with the BLM. Cooperation with private landowners and BLM lessees may be required for certain seeps and springs. Where guzzlers are utilized, Newmont will maintain or replace the guzzlers as required.

Within the Leeville cone of depression (Figure 4-2) in those instances where augmentation is initiated by Newmont for SOAPA or by Barrick for Betze, Newmont will assume augmentation responsibility for an additional 20 years, or as determined by recalibration of the model.

Newmont will use its existing groundwater rights, or obtain additional well permits to implement these mitigation measures. Newmont will transfer 50 percent of any water rights used to mitigate seeps and springs located on public land to the BLM.

Stream and River Mitigation

Within the Leeville cone of depression (Figure 4-2) or where the HCI model predicts that the cumulative addition of Leeville dewatering will decrease the baseflow by 0.1cfs (Maggie, Boulder, and Marys creeks, and the Humboldt River) if augmentation is initiated by Newmont for SOAPA or by Barrick for Betze, Newmont will assume augmentation responsibility for an additional 20 years, or as determined by recalibration of the model.

Beaver Creek: If in the future, Newmont is required to drill and construct a piezometer in the vicinity of Beaver Creek this piezometer will become the trigger well for potential mitigation for Beaver Creek. The trigger for mitigation will depend on how many years of water level data exist for the well. Presumably this piezometer would be constructed years in advance of any potential water level changes in the Beaver Creek area caused by cumulative dewatering effects. Data collected prior to any potential impact will document seasonal and longer-term variations in the water table. Once 10 years of data exist, the trigger elevation for potential mitigation will be based on average yearly groundwater elevation change and any elevation changes caused by drought and wet year cycles. If potential effects to Beaver Creek are detected prior to having 10 years of water level data, mitigation will be triggered when the water level in this well falls to less than one foot above the elevation of the bed of Beaver Creek (measured at the point nearest the well). If trigger conditions are measured in the Beaver Creek piezometer, Newmont will, within 14 days of recording the water level data, initiate consultation with the BLM regarding potential mitigation. Consultation will include the U.S. Fish and Wildlife Service. At that time it will be determined whether it is appropriate to augment, to develop offsite mitigation, or if any action is required at all. Any decisions regarding mitigation at Beaver Creek must consider monitoring data collected at the Beaver baseline springs and Spring Creek.

Humboldt River: If augmentation is triggered, as described above for SOAPA, then Newmont will mitigate potential impacts to irrigation-season flows and water rights holders on the upper and lower Humboldt River by foregoing the use of certain senior irrigation rights controlled by Newmont or the TS Ranch.

Surface Water Quality Monitoring & Mitigation

Newmont samples Rodeo Creek quarterly, if water is present, as part of their Water Pollution Control Permit. Newmont will provide this data to BLM on a yearly basis. If data shows that arsenic or other contaminants are increasing due to mine disturbance then Newmont will coordinate with BLM and the State of Nevada to correct the problem.

Terrestrial Wildlife

A. SUMMARY OF POTENTIAL IMPACTS

Interim loss of 486 acres, less 118 acres with implementation of Alternative C, of primarily sagebrush habitat would impact terrestrial wildlife. After reclamation approximately one half acre would be left unseeded. 5,700 feet of open canal would cross through crucial summer range for pronghorn antelope. The open canal could cause disruption to pronghorn antelope movements and drowning of animals, including mammals, birds, and reptiles. Other direct impacts of the proposed action include collisions by birds with powerlines, collisions with vehicles, and drowning in the proposed canal.

Newmont would construct a reinforced concrete mine water sump which could contain hydrocarbon contaminated water. The hydrocarbon contaminated water has the potential to attract migratory shorebirds and waterfowl and could cause injury or death to these species.

B. TERRESTRIAL WILDLIFE MITIGATION PROGRAM

Alternative A, Eliminate Canal Portion of Water Discharge Pipeline System, will eliminate the 5,700 feet of open canal and eliminate the need for additional mitigation for the potential disruption of pronghorn antelope movements and drowning of small mammals and reptiles in the open canal.

Newmont will comply with the Migratory Bird Treaty Act by minimizing stripping operations during the breeding season (3/15-7/15) of ground nesting migratory birds using the area. If stripping is proposed during the breeding season, nest surveys will be conducted prior to disturbance and buffer zones will be established to protect identified active nests.

The mine water sump will be monitored daily for bird mortalities. Bird mortalities will be reported to Nevada Division of Wildlife. If bird mortalities occur, measures will be taken to prevent birds from coming in contact with the hydrocarbon contaminated water.

Only the cliff areas in the vicinity of the production shaft and support facilities will be left unseeded. This represents approximately one half acre. In 1996 Newmont, Elko Land and Livestock, NDOW, and BLM developed and implemented the Bob's Flat Emergency Fire Rehabilitation and Mule Deer Mitigation Project. As part of this Mule Deer Mitigation project, approximately 3,427 acres were seeded on public lands, and as stated in the agreement these acres were placed in a mule deer habitat mitigation bank for Newmont. Seven Newmont projects have withdrawn acreage from this mitigation bank: South Operations Area Project (800 acres), Bootstrap Project (300 acres), Section 36 Project (211 acres), Lantern Project (75 acres), South Operations Area Project Amendment (139 acres), Leeville Project (1 acre), and Pete Project (264 acres). The mule deer mitigation bank contains an available 1,637 acres for future projects.

Threatened, Endangered, Candidate, and other Special Status Species

A. SUMMARY OF POTENTIAL IMPACTS

Direct impacts to threatened, endangered, candidate, and sensitive species or their habitat include incremental loss of habitat (including prey base) due to mine disturbance. Species with habitat potentially affected by the Project include goshawk, burrowing owl, sage grouse, Swainson's hawk, Preble's shrew, golden eagle, ferruginous hawk, and several species of bat (foraging and roosting habitat).

Base flow reductions in Maggie, Mary's, Beaver, and Boulder creeks and the Humboldt River caused by adding Leeville dewatering to other dewatering operations in the Carlin Trend at any given time would be 0.1 cfs or less. Portions of three streams which support LCT, upper Coyote Creek, upper Little Jack Creek, and a mid section of Beaver Creek, are within the predicted cumulative cone of depression in the Carlin Trend. Other stream segments and springs within or close to the cumulative effects drawdown area support springsnails, Columbia spotted frog, and California floaters.

B. THREATENED, ENDANGERED AND CANDIDATE SPECIES MITIGATION PROGRAM

Lahontan Cutthroat Trout

Continue with Maggie Creek Watershed Restoration Project, as described in the 1993 Mitigation plan for SOAP and as modified in the Final SOAPA EIS since this project has shown excellent results.

If it is determined during the 2002/2003 evaluation that existing culverts are inhibiting fish passage on Little Jack and Coyote creeks, Newmont will replace culverts on Little Jack and Coyote creeks with structures suitable for fish passage by 2004 depending on completion of the permitting process. These culverts will be evaluated for fish passage in 2002 as part of the mitigation for the South Operations Area Project Amendment (SOAPA). Any necessary design work for replacement of these structures will also be completed under SOAPA by 2003 depending on completion of the permitting process. Replacement of impassible culverts with structures suitable for fish passage will facilitate the overall strategy of establishing an LCT metapopulation within the Maggie Creek subbasin.

Newmont will support the Trout Unlimited project titled *Genetics and Movement of Salmonids in Response to Reconnected Populations- Maggie Creek, Nevada*: funded in part by the National Fish and Wildlife Foundation's Strategies for Large Scale Watershed Restoration of Cutthroat Trout program. Newmont will provide access to Newmont controlled lands and will document funds expended by Newmont for enhancement and mitigation within Maggie Creek Basin. This documentation will be provided to the National Fish and Wildlife Foundation to support Trout Unlimited application for matching funds to the National Fish and Wildlife Foundation. The primary goals of the Trout Unlimited plan for Maggie Creek Basin are:

1 To document LCT connectivity among the tributaries and main stem for the Maggie Creek drainage (i.e., does Maggie Creek support isolated tributary and main stem populations with only a few fluvial LCT, or is there a high degree of connectivity with significant numbers of fluvial LCT?).

2 To document LCT use of Beaver Creek in response to culvert/barrier replacement (i.e., will LCT move into Beaver Creek from the main stem of Maggie Creek to locate spawning sites or supplement its small resident population?)

This project began in 2001 and is anticipated to continue for an additional 4 to 5 years, to be completed by 2005 or 2006 depending on success of various sampling methods. Future work along with associated cost projections is shown in Table 1.

Table 1. Work Schedule and Cost Projections for Trout Unlimited Study Titled "Genetics and Movement of Salmonids in Response to Reconnected Populations - Maggie Creek, Nevada".

Task	Year	Annual Cost Projection ($)	Total/Year ($)
General Reconnaisance	2001	31,000	31,000
Weir Trapping	2002	35,000	
Population Survey	2002	5,000	40,000
Weir Trapping	2003	20,000	
Radio Tracking	2003	45,000	
Population Survey	2003	5,000	70,000
Weir Trapping	2004	20,000	
Radio Tracking	2004	30,000	
Population Survey	2004	5,000	55,000
Radio Tracking	2005	30,000	
Population Survey	2005	5,000	
Genetics	2005	30,000	65,000

*Newmont documented $63,000 in qualifying expenditures for habitat and hydrologic monitoring in the Maggie Creek basin for 2001.

Sage Grouse

Predatory bird perch deterrents will be installed on all power lines to be built as a result of the Leeville Project. This action will mitigate the effects of potential predatory bird perch areas within sage grouse habitat. Perch deterrent designs will be completed through consultation with BLM and NDOW biologists.

Bald Eagle

To minimize potential bald eagle mortality as a result of bald eagles feeding on wildlife mortalities on roads, prompt removal of mule deer and other wildlife mortalities on haul roads is necessary. Newmont will comply with their *Wildlife Mortality Reporting and Handling Procedures* which requires prompt reporting and removal of dead wildlife. Prompt reporting and removal of wildlife mortalities assures that bald eagles will not be attracted to haul roads where they would be at risk of vehicular collision.

Wetlands/Riparian Zones

A. SUMMARY OF POTENTIAL IMPACTS

Dewatering activities at the proposed Leeville Project would result in up to a 20 year longer period of recovery for up to 70 acres of riparian vegetation potentially affected by Leeville dewatering.

B. WETLANDS/RIPARIAN ZONES

Mitigation and monitoring for wetlands and riparian zones is covered in the South Operations Area Project Mitigation Plan (1993) as amended by the South Operations

Area Project Amendment Mitigation Plan (2002). Projects initiated under these mitigation plans are incorporated into and continued under the Leeville Project Mitigation Plan. Some of the projects incorporated by tiering include:

1. The Maggie Creek Watershed Restoration Project, includes:
    A. Water Development and Fencing to Enhance Riparian Areas.
    B. Vegetation Management Plan (includes: Riparian Exclusion Zones, Riparian Restoration Zones, and Controlled Grazing Zones)
    C. Conservation Easement, discussed below.

2. The Susie Creek Riparian Enhancement Project.
    A. Installation of fences to exclude livestock along portions of the creek.

3. The Marys River Riparian Project
    A. Drill stock watering wells

4. A Seep and Spring Enhancement and Flow Augmentation Program
    A. Flow augmentation of seeps and springs by drilling a well to supplement water or by providing guzzlers.
    B. Fence springs and seeps to exclude livestock

Conservation Easement

As a result of the dewatering effects from the Leeville Project, the "Term of Easement" page 3, section 1.6 of the Newmont Maggie Creek Conservation Easement (BLM file #N-62094; # 175560, Book 338, pages 476-496 recorded with the Eureka County Recorders Office) will be extended for 78 years.

> Section 1.6, Term of Easement of the Newmont Maggie Creek Conservation Easement will be amended and recorded within 30 days of the Record of Decision to read:
>
> > "The Easement conveyed by this Article I shall terminate in the year 2120 or at such time as Maggie Creek flow augmentation required under the South Operations Area Project 1993 Environmental Impact Statement Mitigation Plan, if any, ceases, whichever is later; provided that in no event shall the term of this Easement extend beyond 2161."

Soils, Vegetation, and Grazing

A. SUMMARY OF POTENTIAL IMPACTS

During the life of the mine, the Leeville Project would result in approximately 486 acres of surface disturbance, less 118 acres with implementation of Alternative C. The direct loss of approximately 264 acres of surface vegetation that is currently open to grazing (36 animal unit months) would occur during the life of the mine and until reclamation is complete. After reclamation is complete approximately ½ acre of rock faces will be left unvegetated.

B. SUMMARY OF EXISTING RECLAMATION PLAN

Newmont's Reclamation Plan describes how the Leeville Project area will be reclaimed to achieve the post mining objectives of wildlife habitat, livestock grazing and recreational use. Closure and demolition of ancillary facilities and mine shafts, regrading of haul roads, the waste rock disposal facility, and ancillary facility areas, erosion and sediment control measures, topsoil and growth medium placement, amendments and fertilization, seeding and post-reclamation monitoring to ensure stabilization has been accomplished and revegation is successful are included. The costs to complete the reclamation activities are calculated and included in the plan. BLM and NDEP must both approve and agree on the proposed reclamation costs. Prior to initiation of work on the project, BLM and NDEP will finalize these reclamation costs and a bond will be posted.

A minimum of 24 inches of growth medium will be spread over the waste rock disposal facility (NDEP may require capillary barriers or impose other capping/closure requirements to meet their objectives of protecting waters of the State) and a minimum of 12 inches of growth medium will be used at all other mine facilities during reclamation. The growth medium cap covering the waste rock disposal facility will be sloped to promote run off of water, prevent ponding or impounding of water, and prevent erosion. (The reclamation plan states that the waste rock disposal facility will have final reclaimed slopes of 2.5H:1V)

At completion of mining, all but approximately 0.5 acres of rock faces would be reclaimed and revegetated.

C. ENHANCED RECLAMATION

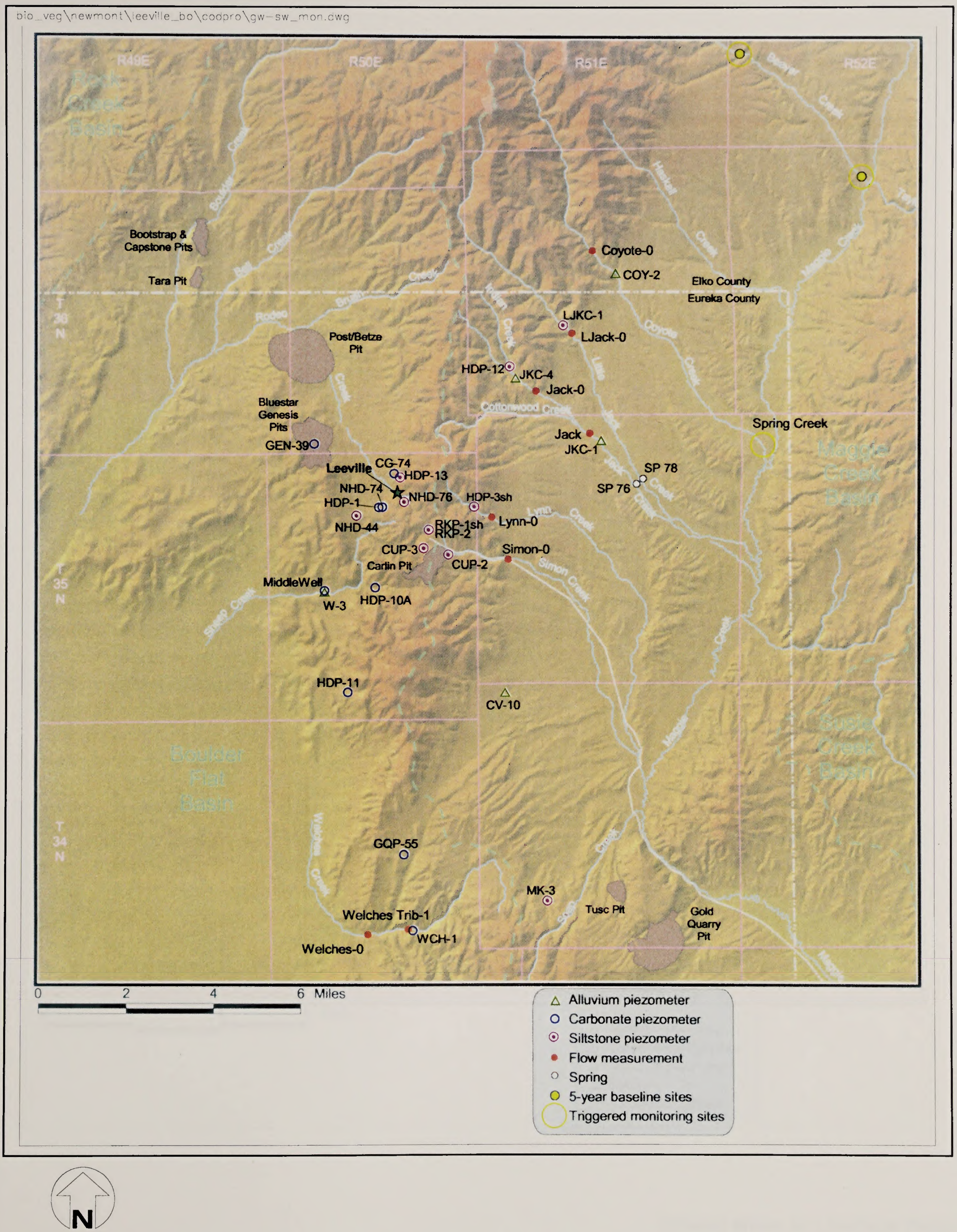
Where material besides soil is used to provide the 12 inches and 24 inches growth medium depths, all stockpiled topsoil will be applied as the final/top surface and amendments will be added as necessary.

Only the cliff areas in the vicinity of the production shaft and support facilities will be left unseeded. This represents approximately one half acre. One acre will be subtracted from the mule deer mitigation bank (as described in the Terrestrial Wildlife Section) to account for the permanent loss of habitat.

Newmont will conduct annual weed surveys and will develop a control plan to ensure that reclaimed areas will be protected from noxious weed invasion. This requirement will end at Bond release for vegetation.

Alternative B- Backfill Shafts

The final closure plan for the Leeville Mine shall include sufficient engineering data regarding the backfilling of the production and ventilation shafts to ensure adequate permanent closure and to account for anticipated occurrences such as compaction and settling of the materials.



Long Term Monitoring Plan
Leeville Project
FIGURE 1

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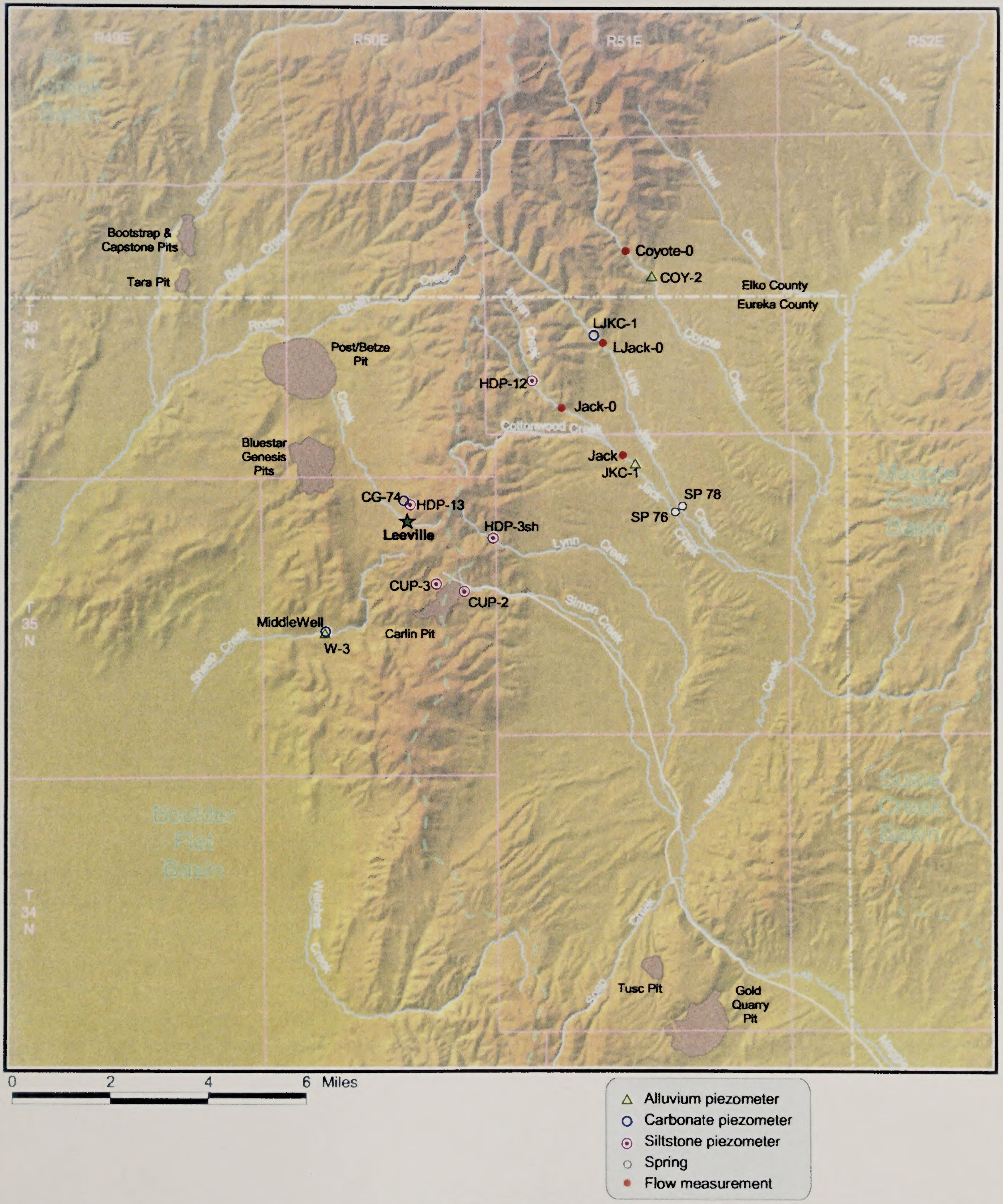

Ground Water and Surface Water
Monitoring Locations
Leeville Project
FIGURE 2

APPENDIX B

Nevada State Engineer Ruling #5011

IN THE OFFICE OF THE STATE ENGINEER
OF THE STATE OF NEVADA

IN THE MATTER OF APPLICATIONS 63984, 63985, 63986, 63987, 63988, 63989 AND 64229 FILED TO APPROPRIATE AND STORE THE PUBLIC WATERS OF AN UNDERGROUND SOURCE WITHIN THE BOULDER FLAT HYDROGRAPHIC BASIN (61), EUREKA COUNTY, NEVADA	RULING #5011

GENERAL

I.

Application 63984 was filed on March 27, 1998, by Newmont Gold Company to appropriate 7.0 cubic feet per second (cfs) of the underground water from the Boulder Flat Hydrographic Basin for mining, milling and dewatering purposes within all of Sections 1, 2, 3, 10, 11, 12, 13, 14, 15, the E½ of Section 16, the N½ of Section 22, and the N½ of Section 23, T.34N., R.48E., M.D.B.&M., all of Sections 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 22, 23, 24, 25, 26, and 27, the N½ of Section 34, and the N½ of Section 35, T.34N., R.49E., M.D.B.&M., all of Section 16, the W½ of Section 4, the E½ of Section 5, the E½ of Section 8, and the W½ of Section 9, T.34N., R.51E., M.D.B.&M., all of Sections 13, 23, 24, 25, 26, 35, and 36, T.35N., R.48E., M.D.B.&M., all of Sections 2, 3, 5, 6, 7, 19, 20, 21, 28, 29, 30, 31, 32, 33, and 34, the S½ of Section 1, the N½ of Section 11, the N½ of Section 12, and the W½ of Section 18, T.35N., R.49E., M.D.B.&M., all of Sections 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 23, and 24, T.35N., R.50E., M.D.B.&M., all of Sections 18, 19, 29, 30, and 32, the W½ of Section 20, and the E½ of Section 31, T.35N., R.51E., M.D.B.&M., all of Sections 2, 3, 10, 11, 13, 14, 15, 24, 25, 32, 33, 34, and 36, T.36N., R.49E., M.D.B.&M., and all of Sections 17, 18, 19, 20, 21, 28, 29, 30, 31, 32, and 33, T.36N., R.50E., M.D.B.&M. The proposed point of diversion is described as being located within the NE¼ of Section 10, T.35N., R.50E., M.D.B.&M.[1]

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[1] File No. 63984, official records in the office of the State Engineer.

II.

Application 63985 was filed on March 27, 1998, by Newmont Gold Company to appropriate 1.0 cfs of the underground water from the Boulder Flat Hydrographic Basin for mining, milling and dewatering purposes within the same places of use identified in Application 63984. The proposed point of diversion is described as being located within the SE¼ of Section 3, T.35N., R.50E., M.D.B.&M.[2]

III.

Application 63986 was filed on March 27, 1998, by Newmont Gold Company to appropriate 7.0 cfs of the underground water from the Boulder Flat Hydrographic Basin for mining, milling and dewatering purposes within the same places of use identified in Application 63984. The proposed point of diversion is described as being located within the NW¼ of Section 2, T.35N., R.50E., M.D.B.&M.[3]

IV.

Application 63987 was filed on March 27, 1998, by Newmont Gold Company to appropriate 34.0 cfs of the underground water from the Boulder Flat Hydrographic Basin for mining, milling and dewatering purposes within the same places of use identified in Application 63984. The proposed point of diversion is described as being located within the SW¼ of Section 2, T.35N., R.50E., M.D.B.&M.[4]

V.

Application 63988 was filed on March 27, 1998, by Newmont Gold Company to appropriate 7.0 cfs of the underground water from the Boulder Flat Hydrographic Basin for mining, milling and dewatering purposes within the same places of use identified in Application 63984. The proposed point of diversion is described as being located within the NE¼ of Section 11, T.35N., R.50E., M.D.B.&M.[5]

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[2] File No. 63985, official records in the office of the State Engineer.

[3] File No. 63986, official records in the office of the State Engineer.

[4] File No. 63987, official records in the office of the State Engineer.

VI.

Application 63989 was filed on March 27, 1998, by Newmont Gold Company to appropriate 22.0 cfs of the underground water from the Boulder Flat Hydrographic Basin for mining, milling and dewatering purposes within the same places of use identified in Application 63984. The proposed point of diversion is described as being located within the NW¼ of Section 11, T.35N., R.50E., M.D.B.&M.[6]

VII.

Item 12 under Applications 63984 through 63989, inclusive, indicates under remarks that the applications are submitted for water right permits to dewater Newmont's Leeville Project, that the applications were filed pursuant to State Engineer's Order No. 1038, that the amount of water applied for is in accordance with preliminary studies of mine dewatering requirements, and that disposal options for the water produced in excess of uses described under Item 3 will be surface discharge, injection, infiltration, stockwatering, and irrigation by primary storage/secondary permits.

VIII.

Application 64229 was filed on June 15, 1998, by Newmont Gold Company to appropriate 78.0 cfs of the underground water developed from the mine dewatering under Applications 63984 through 63989, inclusive. The water is to be stored in a 20,000 acre-feet capacity reservoir for a total of 72,000 acre-feet upon filling and refilling. The application indicates that the manner of use is storage with secondary use applications to be filed for any use not permitted under the above-referenced applications. The proposed point of diversion is described as being located within the NE¼ NW¼ of Section 3 (Lot 3), T.35N., R.49E., M.D.B.&M.[7]

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[5] File No. 63988, official records in the office of the State Engineer.
[6] File No. 63989, official records in the office of the State Engineer.

IX.

Applications 63984, 63985, 63986, 63987, 63988, 63989 and 64229 were timely protested by Eureka County on the following grounds:[1-7]

1. The applications seek to appropriate 78 cfs or 35,008.74 gallons per minute and that the diversion and exportation of such quantity of water will lower the static water level in the groundwater basin and/or area, adversely affect the quality of remaining ground water and threaten springs, seeps and phreatophytes, which provide water and habitat critical to the survival of wildlife, grazing livestock and other surface area existing uses.
2. The appropriation of this water when added to the already approved appropriations and existing uses in the subject basin and/or area will exceed the annual recharge and safe yield of the basin and/or area, and the appropriation and use of water of this magnitude will lower the static water level, degrade the quality of water from existing wells, and cause negative hydraulic gradient influences and other negative impacts.
3. The diversion and exportation of such a quantity of water will deprive the area of origin, the County of Eureka, of water needed for its environmental and economic well-being and unnecessarily destroy environmental, ecological, socioeconomic, scenic and recreational values that the County holds in trust for its residents.
4. Granting or approving the subject applications in the absence of comprehensive water-resource development planning, including, but not limited to, environmental impacts, socioeconomic impacts and long-term impacts on the water

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[7] File No. 64229, official records in the office of the State Engineer.

resource, threatens to prove detrimental to the public interest.

5. Granting or approving the applications would conflict with or tend to impair existing water rights in the subject basin and/or area.

6. The Applicant has failed to provide information to enable the State Engineer to safeguard the public interest properly.

7. The Applicant has failed to provide relevant information denying the Protestant due process and a meaningful opportunity to submit protests to the applications.

8. The granting of the applications would be detrimental to the public interest inasmuch as it may allow the Applicant to "lock-up" vital water resources for sometime in the distant future beyond current planning horizons.

9. The applications should be denied because economic activity in the area is water-dependent and a reduction in quantity and/or quality of water in the area would adversely impact said water-dependent activity (irrigation, grazing, recreation) in the area and the way of life of the area's residents.

10. In a water extraction, and interarea/intercounty conveyance of this magnitude, it is impossible to anticipate all potential adverse effects without further information and study.

11. The exportation of the quantity requested under these applications outside of Eureka County would have an extreme deleterious affect upon the underground water supply of Northern Eureka County. The County requests that any permits granted under these applications be conditioned to provide that: (a) excess water may not be used or transferred out of the Boulder Flat Groundwater Basin and Eureka County, (b) any

uses permitted may not be changed or converted to other uses which would permit a change in place of use to a place outside the Boulder Flat Groundwater Basin and Eureka County, and (c) any permits granted must terminate upon the cessation of mining activity.

12. The approval of these applications as applied for would violate prior actions of the State Engineer and be detrimental to the public interest.

X.

After all parties of interest were duly noticed by certified mail, a public administrative hearing was held on November 27-30, 2000, before the State Engineer at Carson City, Nevada, regarding the protests to Applications 63984, 63985, 63986, 63987, 63988, 63989 and 64229.[8]

FINDINGS OF FACT

I.

The State Engineer initially described and designated the Boulder Flat Groundwater Basin on October 5, 1982, under the provisions of NRS § 534.030, as a basin in need of additional administration.[9] On March 29, 1991, the State Engineer issued State Engineer's Order No. 1038 which provides for well spacing which accommodates the necessities and unique characteristics of mine dewatering within the northern portion of the Boulder Flat Groundwater Basin.[10] The State Engineer finds that the proposed points of diversion under Applications 63984, 63985, 63986, 63987, 63988, 63989 and 64229 are located within the boundaries of the designated Boulder Flat Groundwater Basin, and within the boundaries of the area designated under State Engineer's Order No. 1038.

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[8] Transcript, public administrative hearing before the State Engineer, November 27-30, 2000 (hereinafter "Transcript").

[9] State Engineer's Order No. 799, dated October 5, 1982, official records in the office of the State Engineer.

[10] State Engineer's Order No. 1038, dated March 29, 1991, official records in the office of the State Engineer.

II.

The Protestant alleged that the seven applications seek to appropriate a total of 78 cfs or 35,008.74 gallons per minute (gpm) and that the diversion and exportation of such quantity of water will lower the static water level in the groundwater basin and/or area adversely affecting the quality of remaining ground water and threatening springs, seeps and phreatophytes, which provide water and habitat critical to the survival of wildlife, grazing livestock and other surface area existing uses. The Protestant further alleged that the appropriation of this water when added to the already approved appropriations and existing uses in the subject basin and/or area will exceed the annual recharge and safe yield of the basin and/or area, and that appropriation and use of this magnitude will lower the static water level, degrade the quality of water from existing wells, and cause negative hydraulic gradient influences and other negative impacts.

At the administrative hearing, the Applicant never once indicated that it was planning on using the 35,000 gpm applied for, but rather, indicated that its anticipated maximum pumping rate would be 25,000 gpm, and this 25,000 gpm figure was the quantity used in its modeling and other planning. However, it wants to have the 35,000 gpm for flexibility.[11]

While protesting the applications on the grounds that the diversion and exportation of such a quantity of water would threaten springs, seeps and phreatophytes, which provide water and habitat critical to the survival of wildlife, grazing livestock and other surface area existing uses, the Protestant also put on testimony that appeared to indicate its belief that increasing the use of water by phreatophytes in the area was a waste of water.[12]

In 1989, the State Engineer made a policy decision to allow short-term over-pumping of the groundwater basin because mining is considered a temporary use of ground water, the quantity was relatively small and the basin would come back into equilibrium in a relatively short time. Now, the time frame for mining keeps extending out and the mines are requesting more and more quantities of water to be pumped and the time for recovery to equilibrium also keeps extending outward.

Testimony was provided that indicates that natural recharge to the Boulder Flat Groundwater Basin has been estimated at 11,584, 14,000 and 30,000 acre-feet annually,[13] and evidence was provided that permitted and certificated water rights far exceed this amount.[14] Between Newmont and Barrick, the maximum amount of water allowed to be pumped is 146,426 acre-feet annually, and this does not take into consideration other water rights in the groundwater basin.[15]

The Protestant recognizes that mining is an extremely important industry to the State of Nevada and Eureka County, and the Protestant does not want to see mining leave the county.[16] In fact, much of the tax base of Eureka County comes from the mining industry;[17] however, as more and more mines come on line, the Protestant has concerns with the continued dewatering and believes that the long-term issues should be addressed.[18]

The State Engineer finds the evidence does not support the 35,000 gpm applied for, but rather a maximum pumping rate of 25,000 gpm. The State Engineer finds the policy of short-term

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[11] Transcript, pp. 15, 80-81, 262-263, 323, 407-408, 481, 681.

[12] *See generally*, testimony of Gary Small, pp. 584-585, 611-612, 621.

[13] Transcript, pp. 284-285; Exhibit No. 14.

[14] Exhibit No. 52(c).

[15] Exhibit No. 52(c).

[16] Transcript, p. 638.

[17] Transcript, pp. 125-130, 304-316.

[18] Transcript, pp. 638-639.

over-pumping will continue to be allowed; however, upon the granting of these applications Newmont Gold Company will be confined to the existing 2,000 million gallons annually water rights cap on consumptive use under which it already operates; therefore, in effect, the State Engineer is not granting any additional consumptive use from the groundwater basin. The State Engineer finds, due to the concerns of the long-term effects of the mine dewatering, and due to the fact that additional mines keep coming on line and the time line for pumping keeps being extended out, that he is requiring Newmont to recharge this dewatering water within the groundwater basin or use it as a substitution for agricultural water rights in the groundwater basin. However, discharge to the Humboldt River may only be permitted under the permits granted under these applications if the applicant can show there is no other solution for disposition of the excess water within the groundwater basin.

III.

The Protestant alleged that the diversion and exportation of such a quantity of water will deprive the area of origin, Eureka County, of water needed for its environmental and economic well-being and will unnecessarily destroy environmental, ecological, socioeconomic, scenic and recreational values that the County holds in trust for its residents. The State Engineer finds the Protestant provided no citation to authority which requires water to remain in the area of origin or that Eureka County holds environmental, ecological, socioeconomic, scenic and recreational values in trust for its residents. The State Engineer finds that by requiring recharge of the water within the groundwater basin as the first method of disposal or use as a substitution for existing water rights, the water will most likely remain in the area of origin.

IV.

The Protestant alleged that granting or approving the subject application in the absence of comprehensive water-resource development planning, including but not limited to, environmental impacts, socioeconomic impacts and long-term impacts on the water resource threatens to prove detrimental to the public interest. The State Engineer finds there is no provision in the Nevada Water Law which requires the type of comprehensive water resource development planning desired by the Protestant prior to the granting of a water right application. The State Engineer further finds that the requirement of a monitoring plan produces information relevant to the determination of environmental impacts, and it is the purpose of monitoring to assure there is an early warning system in case diversion needs to be curtailed.

V.

The Protestant alleged that the granting or approval of the applications would conflict with or tend to impair existing water rights in the subject basin and/or area. The State Engineer finds the Protestant did not provide evidence as to any specific water right that would be jeopardized by the granting of these applications.

VI.

The Protestant alleged that the Applicant failed to provide information to enable the State Engineer to safeguard the public interest properly. The State Engineer finds no evidence or argument as to this protest claim was provided at the administrative hearing.

VII.

The Protestant alleged that the Applicant failed to provide relevant information denying the Protestant due process and a meaningful opportunity to submit protests to the applications. The State Engineer finds no evidence or argument as to this protest claim was provided at the administrative hearing.

VIII.

The Protestant alleged that the granting of the applications would be detrimental to the public interest inasmuch as it may allow the Applicant to "lock-up" vital water resources for sometime in the distant future beyond current planning horizons. The State Engineer finds the Protestant did not provide any evidence or argument as to how this violates Nevada Water Law.

IX.

The Protestant alleged that the applications should be denied because economic activity in the area is water-dependent and a reduction in quantity and/or quality of water in the area would adversely impact water-dependent (irrigation, grazing, recreation) activity in the area and the way of life of the area's residents. The State Engineer finds the Protestant did not provide any evidence or argument as to how this violates Nevada Water Law.

X.

The Protestant alleges that in a water extraction, and interarea/intercounty conveyance of this magnitude, it is impossible to anticipate all the potential adverse effects without further information and study. The State Engineer finds this protest claim does not provide any issue of Nevada Water Law that can be addressed by this ruling.

XI.

The Protestant alleged that the exportation of the quantity requested under these applications outside of Eureka County would have an extreme deleterious affect upon the underground water supply of Northern Eureka County and requests that any permits granted under these applications be conditioned to provide that: (a) excess water may not be used or transferred out of the Boulder Flat Groundwater Basin and Eureka County, (b) that any uses permitted may not be changed or converted to other uses which would permit a change in place of use to a place outside the Boulder Flat Groundwater Basin and Eureka County, and (c) any permits granted must terminate upon the cessation of mining activity. The State Engineer finds he is requiring that Newmont only be allowed to discharge out of the groundwater basin if it can show there is no other solution for use of the excess water within the groundwater basin, and the other permit terms requested by the protestant are being incorporated.

XII.

The Protestant alleged that approval of these applications as applied for would violate prior actions of the State Engineer and be detrimental to the public interest. The State Engineer finds the Protestant did not provide any evidence or argument as to this protest claim at the administrative hearing.

Mining has been a predominant economic force in Nevada since before statehood, and mining related activities are recognized to be of paramount interest to the State. Mining has been designated as the preferred use of water in many groundwater basins in Nevada; however, no such designation has been made in Boulder Flat Groundwater Basin. The State Engineer finds that the mining, milling and dewatering uses of water contemplated under the applications are a beneficial use of water and approval of the use of ground water for these purposes does not threaten to prove detrimental to the public interest.

XIII.

The State Engineer finds that mining, milling and dewatering are by their very nature a temporary use of water and the State Engineer may issue permits to appropriate the public waters under the preferred use provisions of NRS § 534.120(2).

CONCLUSIONS OF LAW

I.

The State Engineer has jurisdiction over the parties and of the subject matter of this action and determination.[19]

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[19] NRS chapters 533 and 534.

II.

Nevada Revised Statute § 534.120(2) provides that in the interest of public welfare the State Engineer is authorized and directed to designate preferred uses of water within the respective areas so designated and from which the ground water is being depleted, and in acting on applications to appropriate ground water he may designate such preferred uses. The State Engineer concludes that mining is identified as a preferred use of ground water under Nevada Water Law within this groundwater basin.

III.

The State Engineer is prohibited by law from granting a permit under an application to appropriate the public waters where:[20]

A. there is no unappropriated water at the proposed source, or
B. the proposed use conflicts with existing rights, or
C. the proposed use threatens to prove detrimental to the public interest.

IV.

The State Engineer concludes that since he is requiring these appropriations to be contained within the consumptive use cap on water already appropriated by the Applicant from the groundwater basin, he does not consider these water rights to be an additional appropriation of water. The State Engineer further concludes that mine dewatering presents a unique situation that may require pumping to remove water in excess of the perennial yield in order to reach the ore body. Since mining is considered to be a temporary use of water and is an industry of such importance to the State of Nevada, State Engineers have previously allowed the appropriation of underground water from a particular area in excess of the perennial yield. This was done under the analysis that when mining ceases the water right permits also cease to exist, that is, the right to appropriate water ceases and the water is returned to the source and the system will return to a balance over time.

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[20] NRS chapter 533.370(3).

V.

The State Engineer concludes that no provision of Nevada Water Law requires that water be retained in the area of origin and no citation to authority for this protest claim was provided. The State Engineer further concludes that Eureka County did not cite to any provision of the law indicating that Eureka County holds in trust for its residents the environmental, ecological, socioeconomic, scenic and recreational values which requires any analysis in conjunction with the granting of a water right application or how this restricts a request to appropriate water.

VI.

The State Engineer concludes that no provision of Nevada Water Law requires the type of comprehensive water-resource development planning requested by the Protestant prior to the approval of a water application; therefore, it does not threaten to prove detrimental to the public interest to grant a water right application in the absence of such planning.

VII.

The State Engineer concludes since the Protestant did not provide evidence as to any specific water right that would be jeopardized by the granting of these applications and he is unaware of any water right impaired by the granting of these applications, the granting or approval of the applications will not conflict with or tend to impair existing water rights in the subject basin and/or area.

VIII.

The State Engineer concludes that since the Protestant did not provide any evidence or argument to support its protest claim that the Applicant failed to provide information to enable the State Engineer to safeguard the public interest properly, the claim is without merit.

IX.

The State Engineer concludes that since the Protestant did not provide any evidence or argument to support its protest claim that the Applicant failed to provide relevant information denying the Protestant due process and a meaningful opportunity to submit protests to the applications, the claim is without merit.

X.

The State Engineer concludes that Nevada is a prior appropriation state, that is, first in time, first in right, and that the granting of a water right would not "lock-up" water resources as long as the resource is put to beneficial use within a reasonable amount of time in the project applied for under the applications. The State Engineer concludes that this prior appropriation analysis also applies to the protest claim that economic activity in the area is water-dependent and a reduction in quantity and/or quality of water in the area may or could adversely impact water-dependent (irrigation, grazing, recreation) activity in the area and the way of life of the area's residents. In addition, mining also provides an economic base for the County.

XI.

The Protestant alleges that in a water extraction, and interarea/intercounty conveyance of this magnitude, it is impossible to anticipate all the potential adverse effects without further information and study. The State Engineer concludes this protest claim does not provide any issue of Nevada Water Law.

XII.

The Protestant alleged that approval of these applications as applied for would violate prior actions of the State Engineer and be detrimental to the public interest. The State Engineer concludes that since the Protestant did not provide any evidence or argument as to this protest claim at the administrative hearing he is unable to address the merits of the claim, and therefore, concludes the claim is without merit.

RULING

The protests to Applications 63984, 63985, 63986, 63987, 63988, 63989 and 64229 are hereby overruled in part and granted in part. Applications 63984, 63985, 63986, 63987, 63988, 63989 and 64229 are hereby granted subject to:

1. Existing rights;
2. Payment of the statutory permit fees;
3. A monitoring program approved by the State Engineer prior to the pumping of any water under these permits;
4. The permittee shall submit to the State Engineer by February 15th each year a report which includes a water management plan with the expected pumping for the next year and expected methods of disposal, water level measurements, and a summary of the pumping over the last year;
5. No water is to be discharged out of the groundwater basin unless the permittee can show there is no other solution for disposal;
6. The total combined consumptive duty of water under Permits 49960, 50688 (Certificate 13878), 50939 (Certificate 13880), 51074, 51750, 51963, 52354, 52795 (Certificate 13396), 52797 (Certificate 13397), 52999, 53000, 54335, 54337, 55127, 56607, 56608, 56609, 56610, 56611, 56612, and 63984 through 63989, inclusive, and any subsequent changes of these permits will not exceed 2,000 million gallons annually;
7. The pumping rate under Applications 63984, 63985, 63986, 63987, 63988 and 63989 is limited to 25,000 gallons per minute;

8. Application 64229 is limited to 55.7 cfs and any use of water under the primary permit will be specified on secondary applications as to the place of use and beneficial use.

9. Any uses permitted may not be changed or converted to other uses which would permit a change in place of use to a place outside the Boulder Flat Groundwater Basin;

10. Upon cessation of mining activity and mine reclamation these water rights will return to the source;

11. Under Applications 63984, 63985, 63986, 63987, 63988 and 63989, wells or sumps may be located and drilled anywhere within said 160-acre area as required for mine dewatering purposes without filing for a temporary change in point of diversion during that year. A change application shall be filed on or before January 15th of each of the subsequent years setting forth more exact location(s) of each producing well or pumping site within the 160-acre areas permitted.

Respectfully submitted,

Hugh Ricci, P.E.

HUGH RICCI, P.E.
State Engineer

HR/SJT/hf

Dated this 5th day of

April, 2001.

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